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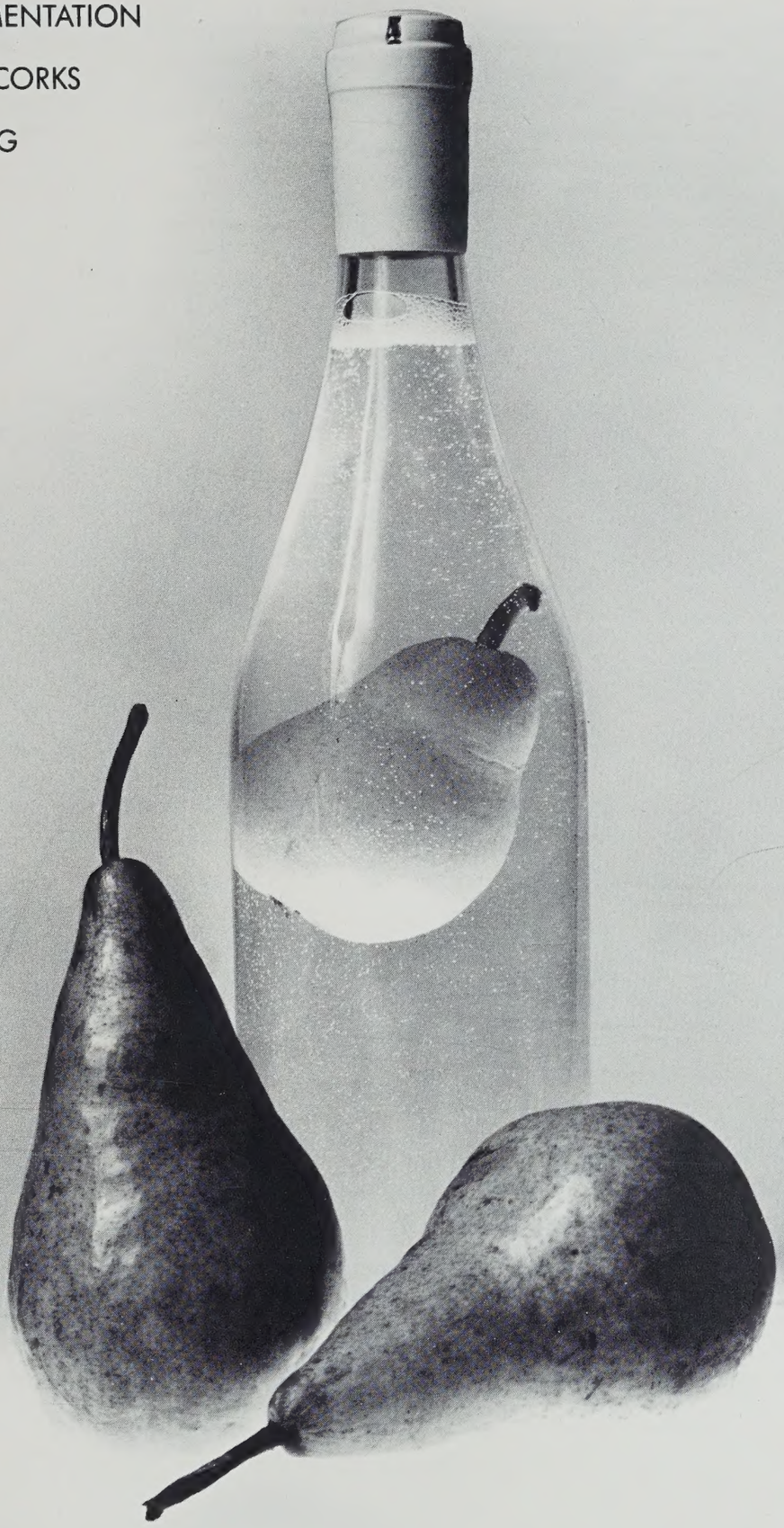

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THE WINEMAKING REVIEW

MARCH-APRIL 1983

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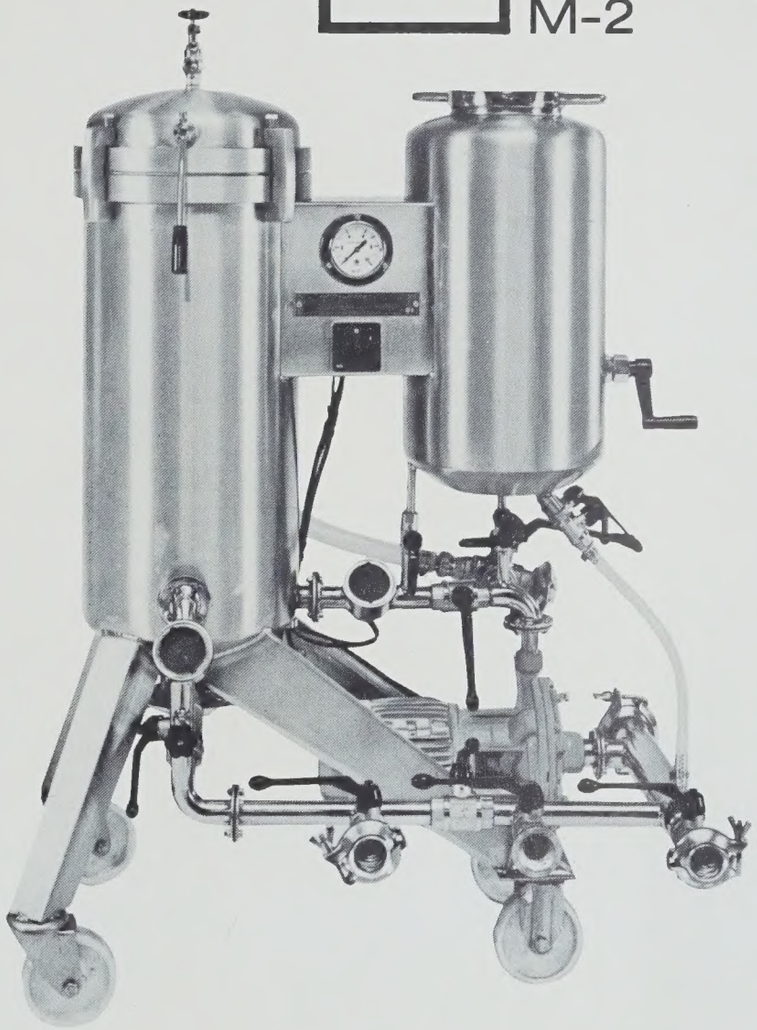

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Letters to the Editor

Dear Editor:

I am writing to emphasize what I feel is a need—The American Wine Machinery Manufacturers Association. It is about time the domestic manufacturers realize that their greatest competition comes from foreign manufacturers. All one has to do is look around or through the trade journals and examine the machines that U.S. wineries are using. It is all foreign except for a very few items like tanks.

The establishment of the Italian Trade Commission is a good indication of what is to come.

The wineries are all concerned over the increase of imported wines. While the consumption of foreign wines might tell them something, their desire to sell us wines to first the U.S. market and second to an export market, they are all furthering the foreign cause by buying foreign-made equipment.

When you consider the fact that if more business was to be made by American manufacturers "if" the market were not so saturated with foreign machines then there would be more development from U.S. makers.

The Wine Industry started on foreign soil. We are constantly bombarded with propaganda from them. The teaching of winemaking came and continues to come from distant lands. We tend to revere the foreign trademark and false excellence.

When do we cut the umbilical cord? If the U.S. Wine Industry is to stand on its own two feet, then aren't we ready to stand together? Doesn't the use of U.S. made machines merely support the thinking that we have served notice of our "Declaration of Independence" by having the wineries join with machine makers and show a united front? I doubt seriously if any of the wineries have ever thought of this.

I would like to suggest the slogan, "Fine American Wines are processed with American Made Machines".

Arthur J. Hunt, President
Liquid Extraction Systems, Inc.
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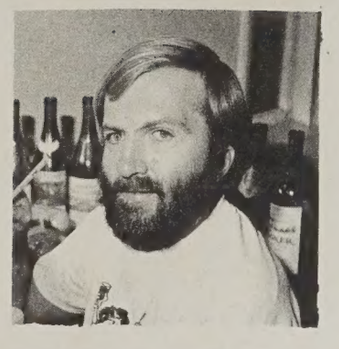

First of all, I want to clear up any confusion resulting from the Must Chiller story in the January-February issue. The chillers at Robert Mondavi Winery and Simi Winery were built by Industrial Refrigeration And Process Piping (IRAPP), Healdsburg, CA. Inglenook's chiller was built by Thermxchanger, Oakland, CA. I apologize for any confusion caused by not properly identifying the contractors.

Second, I would like to ask you to add the following information accidentally left out of your bottle guide in Jan-Feb '83. Owens Illinois on page 56 has 1.5 liter Burgundy in Champagne Green and Georgia Green, 1.5 liter Bordeaux in Champagne Green and Georgia Green, 1.5 liter Champagne pushup in Champagne Green, 1.5 liter Composite in Champagne Green and Georgia Green, 3 liter Classic Jug in Champagne Green, 4 liter Class Jug in Champagne green, Emerald Green and Georgia Green.

About a year ago at a WITS lunch table, Mary Ann Graf said to me, "People get too serious about wine." I didn't believe her then, I would never get 'too wrapped up' in wine! The lady was right! With this issue, I hope to add a little humor to your reading with the addition of Cashflow, Enoquips and Jake Lorenzo.

I hope you all saw the 60 Minutes program on SO_2 and winemaking, bear in mind they cited use by a **home winemaker,** how accurate was his measurement? SO_2 levels must be kept as low as possible and watched carefully, I will have a story on the topic after the '83 crush.

I want to acknowledge Bill Preston's time and energy donated to summarizing Dr. Lee's cork sterilization papers from Australia, THANKS!

I want to welcome Bruce Rector as our regular columnist on winemaking questions-keep sending those questions to our office for the **Quality Approach.**

The Merlot and Fruit Wine stories were a lot of fun and work to put together, we are trying to cover the whole spectrum-across the country!

Cabernet Sauvignon—many people's favorite. We will begin a series in the next issue with the Martini vineyard appellation comparison of looking at individual winery's approaches to the grape. Story suggestions of wineries giving extra emphasis to this grape are welcome!

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COVER PHOTO: **Pear Wine photographed by J. Michael Kanouff.**

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LOGGED VINEYARD SITE to be cleared for planting.

PRODUCING VINEYARD in place of trees used for winery building.

Fisher Winery Receives Architectural Award

DIMENSION SAWMILL shapes trees into lumber on the Fisher property.

Fisher Vineyards Winery has been selected by a national panel of jurors to receive the first Honor Award of the American Institute of Architects' California Council. Fisher Winery was one of 12 projects and the sole winery chosen as exemplifying the best design work of California architects completed throughout the world since 1975. Over 90% of the lumber for the winery building required came from the property.

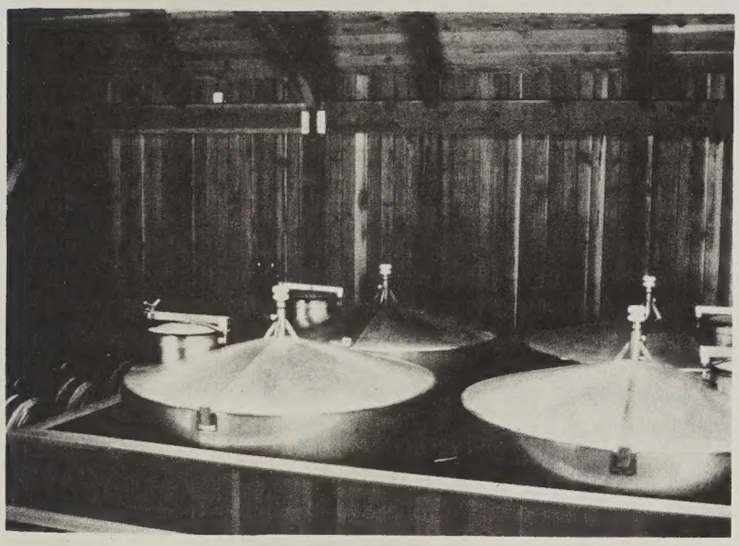
Fred Fisher, proprietor and winemaker, bought an 84 acre plot at 1200 foot elevation, located in the Mayacamas Mountains half-way between downtown St. Helena and the 101 Hwy in Santa Rosa, in 1973. Twelve acres was cleared of rocks and a few trees in '74 and '75 and planted in Chardonnay and Cabernet Sauvignon. Fisher worked at Cuvaison during the '75 crush and learned about winemaking.

In January '79, Fisher decided to build a winery. He and consultant, Chuck Ortman did an economic study and picked a 7,000 case production target and roughed out a two-floor plan. Fisher gave those ideas to William Turnbull, an architect, and said, 'I think it might be practical to timber douglas fir and redwood from the property.' Sonoma County, where the property is located, allows timbering for on-site use as long as the lumber is not sold off the premises.

Fisher chose a four and one-half acre site with a southern exposure on a reasonably shallow slope with soil of sufficient depth for vines to timber. The site provided all the Douglas Fir and two redwood trees in a ravine adjacent to the building were used for the exterior protective layer.

Peter Swensen, a logger then located in Santa Rosa and now in Oregon, brought in his dimension sawmill which rode on a 24 foot long truss powered by a Volkswagen engine. With one extension to the truss, the longest piece – 6'X10'X28' was cut, along with 6'X12', 1'X12', and 2'X6' lumber. 6'X12' and 1'X12' pieces were used roughsawn and untreated in the building. 2'X6' pieces were finished in another mill for tongue-and-groove floor and wall structure application.

The 15 degree slope was cleared of stumps by Swensen's



WOODEN INTERIOR surrounds tanks.

WINERY WITH REDWOOD EXTERIOR SIDING is built into the hillside to help control barrel cellar temperature on lower level.

tractor and Chardonnay vines planted in the spring of '80 which will produce their first crop this year. The new as well as the older vineyards are all irrigated. The older vines have produced just under two tons/acre from about two-foot deep soil. Fisher expects a little better production from the new plot which has six feet of top soil.

The 32' X 70' building is set half-way into a hillside to help maintain the winery temperature. The building design is a heavy timber frame throughout with structural plank walls spanning between horizontal framing girts. The roof is of plank decking.

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MUST to MARKET By NANCY LYNN GRAY

Winemakers used to talk about malolactic and stuck fermentations. Now, marketing and sales are the progressive topics of concern and worry. Winemakers need to become more aware of the wine market in the United States.

This was evident at the 1983 WITS (Wine Industry Technical Seminar) in January at the Hyatt Hotel in San Jose, CA. This year, for the first time, WITS offered a separate afternoon program devoted entirely to wine marketing. Attendance in itself showed that wine producers realize they need to know more than how to make wine, they need to know how to sell it.

Ed Everett, editor of **The California Wine Merchant's Gazette** and **The Wine Trade,** organized the afternoon program, consisting of four different panel discussions between wine professionals successfully involved in marketing and selling wine. After each panel member spoke, discussion was opened up to the audience.

Wine sales in 1982 and how they will effect the market in 1983 was tackled by the first panel. Edwin Lefcourt, wine importer/broker and negociant for Lefcourt Cellars, emphasized how the strength of the American dollar against the franc and lire in 1982 were partially responsible for creating a highly competitive marketplace between American wines and some of the better imports.

Bob Sawicki of Almaden Import Cellars echoed these evaluations, stating that the lower interest rates had merely slowed down what could be an oncoming economical disaster.

Pat Dore, a California wine broker and entreprenuer of his own label for Coastal Wines Limited, joined in the discussion with columns of statistics adding up the amount of uncommmitted case goods going into 1983 to be 48.4 million cases, while the increase in wine sales in 1982 was a mere 1% over 1981.

Gerald Asher of Mosswood Wine Company, wine writer for **Gourmet** and author of **On Wine,** moved beyond the superficial economical aspects and went to the core of the problem. Asher acknowledged that there is a great deal of wine out there and that import sales are increasing due to attractive price values, but the real problem does not lie in a battle between French, Italian and California wine. These sales only represent a fraction of the market. The problem is that wineries have directed most of their sales energy to one tiny segment of the total market. They have been blind and willfully ignorant of the multitude of different markets throughout America.

Instead of trying to broaden the base of wine drinkers, the wine industry has confused the population with strange wine related jargon and hosh-posh vertical tastings, making potential consumers feel they have to spend many hours learning all this mumbo-jumbo before ever being able to enjoy the wine itself.

Because the national and international economy is expected to continue in the same direction, with even more wineries, more labels and more wine to sell to a small audience of selective, price conscious wine drinkers, the wine industry must combine their efforts to expand the base population of wine drinkers in order to promote a future for wine in the United States.

Wineries need to take a hard look at their product and where it fits in today's market. What varietals are they making, in what style-are these currently in demand? Edwin Lefcourt was bold enough to suggest wineries make nothing but Cabernet Sauvignon and Chardonnay, but he did so only to make a point: Cabernet and Chardonnay are selling, they are what consumers want.

Lefcourt added that wineries need to "gather intelligence", go out and talk to retailers, restaurateurs, listen, find out what the consumer wants and then re-evaluate their position in the market.

On another panel, Darrel Corti, wine buyer/retailer for Corti Brothers in Sacramento, offered a plea for wineries to make "the right wine, for the right price, for the right customer". What varieties, within what price range, are right for your customer?

While Cabernet and Chardonnay are quite fine, Corti mentioned that as a retailer with limited shelf space, there are only so many Cabernets and Chardonnays he can sell in one store. If he buys a winery's new $12.00 Chardonnay, he has to bump someone else's $12.00 Chardonnay off the shelf. Corti sug-

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gested that wineries should try making a unique, unusual variety, such as Muscat or late harvest Semillon, thus offering the retailer a specialty item that cannot easily be replaced.

California is not the only place where wine can be sold. In fact, this small segment of the market is so grossly saturated it is drowning in an endless tide of new wineries and labels. Both retailer and their customers are almost forced to be fickle in their purchases.

Frank Woods, president and marketing director of Clos du Bois winery, outlined three untapped markets for California premium wine:

1. exportation to foreign markets
2. out-of-state
3. the revolutionary movement of California Cuisine

While certain governmental barriers will need to be relaxed before foreign export is economically and logistically feasible as an alternative market, out-of-state sales present an open field of possibilities. Woods suggests wineries choose four to six out-of-state markets and inundate every single restaurant and retail account.

Even within California certain market areas are totally ignored or passed by as wineries keep trying to cram their wines into already overly crowded "big city" areas. Ed Everett commented that certain rural towns "in our own backyard" have been ignored. Salespeople won't take the time or trouble to make a two case sale in a small isolated area, yet these potential accounts are hungry for fine wine.

Before embarking on a nationwide sales campaign, a winery should formulate a sound marketing-sales plan. Fred Holzknecht of Vintage Wine Merchants, a wine marketing company, spoke adamantly on the advantages of hiring a professional marketing firm.

Holzknecht stated examples of how Vintage Wine Merchants have overcome the competition posed by low-cost imports and wineries offering incredible discounts and post-offs, by focusing on "the quality of the sale". Their success is due to consistency in wine supply and quality from wineries representing the major California wine producing areas, providing point of sale material, educational tasting opportunities and promotional sales ideas.

Dennis Marion, wine broker and negociant for his own private label, advised what he called a "holistic approach" to wine marketing which involves the traditional systems of distrbution and more direct, higher profit sales such as mail order programs and direct winery-retail sales.

Marion stressed the need for wineries to create sales programs which "stand out", encouraging distributors to use winery discounts and post-offs to provide incentives for their salespeople.

Along those same lines, Marion stated that wineries need to adopt a national pricing system, one which allows out-of-state retailers to sell their wine at a price close to the California retail price. Distribution and shipping fees should be worked into the pricing schedule in such a way that the out-of-state retailer is not forced to sell a $12.00 bottle of wine for $15.00.

Covering the retailer's view of the 1983 wine market along with Darrel Corti were Doug Ridgeway, the Northern California wine buyer for 35 Liqour Barn stores, and John Gay, contributing editor to **The California Wine Merchant's Gazette** and previous wine buyer/retailer for Marin Wine and Spirits.

Ridgeway outlined how the large discount stores are the future of California wine retailing. With a large amount of shelf space, these stores are able to accomodate the proliferation of wine labels. They are able to work with wholesalers, providing rapid turnover, large case sales, and advertising while giving the consumer the value and selection they are looking for.

Gay brought up one scarey aspect in the growth of discount stores. They propose a potential threat to the balance of power which exists within the three tier system of distribution.

Liquor Barns do sell a lot of wine. Distributors need their business. But, as Liquor Barns continue to grow, will they need to do business with the distributor? Why should then not "step over" the distributor and deal directly with the winery, demanding winery FOB prices? If the winery refused, their wines would simply be dropped from their stores.

Gay was quick to mention that so far to his knowledge such pressure tactics have never been attempted, though he suspects it will happen sooner or later.

Everett titled the fourth panel, "Selling Wine Through the Cracks". The panel consisted of two men who had successfully side-stepped the more traditional ways of selling wine.

Peter Friedman explained the evolution of his winery, the Belvedere Wine Company. This winery uses a marketing technique of releasing their wines not under the winery name, but under the name of the grower who grew the grapes, for example, Bacigalupi Pinot Noir, or Robert Young Chardonnay.

Introduced as a "salesman", Tom Ripp began by telling wineries that "there is so much forest, you cannot see the trees", that wineries are "stuck in their own stuff". Ripp and his company, Negociants West, sell wine by working conventions in the San Francisco area. Eight months before a convention is scheduled to arrive in town, Negociants West sends a letter to the secretary of that convention, offering to commemorate their convention with wine. Convention groups may choose between wines for $10.00, $15.00, and $20.00. Each conventioneer receives a bottle of wine with a special neck label which commemorates the occasion.

Different wine selections are served at their various functions and dinners. If conventioneers are scheduled to dine in a restaurant, Negociants West will make arrangements for wine to be delivered to the restaurant and the corkage fees will be paid for.

In putting together a winery survival kit for 1983, the WITS seminar covered many areas that need immediate attention. Through the contradicting and agreed opinions which existed between speakers, one concept remained clear: if wineries are to continue making wine, they are going to have to learn how to sell it. Wineries must research the markets available to them, take a direction, make a plan, and sell, sell, sell!

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Quality Q's & Approach A's

By BRUCE RECTOR

Q: What is the single most important thing to do in the winery to protect quality?

A: Top up! There seems to be a raging misconception in the industry that wine quality can be protected in a half-filled tank by blanketing with CO_2. The incorrect thought is that the CO_2 is heavier than air and therefore, it will 'sink' to the surface of the wine. This is simply not the case.

Imagine yourself in a room full of people exhaling CO_2. Put your mouth right down by the floor. Do you suffocate? No, because the gases reach an equilibrium in the room, filling the volume evenly from top to bottom.

The misconception goes even further by the belief that microbial activity is limited by this 'blanketing'. Once again, oxygen is not completely dispelled from a tank by blasting in some CO_2. Microbes such as acetic acid bacteria can stay alive and reproduce; spoilage organisms such as mycoderma (skin yeast) are not slowed down much at all. The fact that there is an interface of liquid to gas gives many organisms all the help they need to spoil wine. Even if you use the inert gas argon, the micro-organisms are not going to be suffocated under the blanket.

The other consideration is that a half-full tank has a head space that is going to allow the constant volatilization of certain compounds, thereby reducing the intensity of the nose.

Unless you are trying to make sherry, there is no way a half-full tank is going to improve the quality of the wine.

Q: Do you use the classic French technique as described in your fining article last issue when you are fining a barrel of red wine?

A: I make some changes. I don't use a copper bowl to initially mix up the egg whites. I use about a cup of water for each egg white to initially dilute them, then start adding the wine.

I don't beat the mixture to a froth. Frothing the egg whites produces bubbles which can contribute to the denaturation of the protein. The protein stretches over the surface of the bubble causing enough stress on the molecule that the hydrogen bonds are broken and the ribbon-like structure of the protein unfolds, denatures, and makes the protein less or not at all reactive.

I use a white five gallon bucket to do the initial mixing and finally make about four gallons of 'slurry'. With a one-half inch I.D. tube, I siphon the wine back into the barrel while moving the end of the hose around the upper part of the barrel.

I then mix with a paddle, being careful not to deform the bung hole by striking the sealing surface with the paddle handle. And I never eat the yolks-they have too much cholesterol.

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FRUIT WINE

SORTING FRUIT at Nashoba Valley Winery.

Are there particular fruits that make better wines? What different techniques are used in their production? Winemakers in six states were interviewed:

Anthony Aellen, Berrywine Plantations, Maryland; Jim Cook, Buzzard Lagoon Vineyard, California; Robert Hudson, Ellendale Vineyards, Oregon; Doug Welsch, Fenn Valley Vineyards, Michigan; Bruce Simpson, Good Harbor Vineyards, Michigan; Bill Wrey, Honeywood Winery, Oregon; Robert Kirkpatrick, Kirkpatrick Cellar Winery, California; Ed VanDyne, Leelanau Wine Cellars, Michigan; Jack Partridge, Nashoba Valley Winery, Massachusetts; Ron Vuylsteke, Oak Knoll Winery, Oregon; Brian Carter, Paul Thomas Wines, Washington; and Gary Hada, Summerhill Vineyards, California.

Do you specify a variety of fruit and the ripeness?

Two peach varieties are used at **Berrywine Plantation,** which are overripe-soft ripe and have the fullest flavor. Two raspberry wines are made, one from the Black Raspberry and one from the red (Heritage) variety.

Red plum wine is made from the red and yellow meat members of the Japanese Plum family. Black Tartarian is the first choice for black cherry wine, because of its good flavor. Thornless, trailing blackberries are used for blackberry wine.

All fruits are used fresh except for Damson Plum which ripens at the same time as grapes, so they are put into cold storage and held until after completion of grape fermentation, when fermenting space is available.

Sour, tart, high acid apples are used in **Ellendale** apple wine. Apples varieties are Gravenstein, Rome, Jonathan, and MacIntosh and up to one-third of the blend is Delicious as filler. Apples come from cold storage at an average of 15-16 °Brix.

Marion is the best variety of blackberry, Evergreen has a color stability problem. Using frozen strawberrys, Totem is the first choice with the best color stability, Hood is second choice, Benton is third choice. Frozen cherrys of the Montmorency variety are used and frozen Crimson rhubarb. Frozen Purple Italian plums that have been washed, sorted and depitted are used.

For **Fenn Valley** peach wine, Harmony, a Canadian peach variety, is grown which ripens on the tree all at once, to give a sufficient volume for fermentation. Red Haven is a popular variety in Michigan, but it ripens over a 10-14 day period, which would take too long to get a quantity sufficient for fermentation. For apple wine, the high acid varieties, MacIntosh, Northern Spy, and Jonathan are used.

Bartlett pears are grown on **Good Harbor's** farm. Picked yellow and left to sit for a couple of days, they are good and ripe but not mushy. English Morello and Montmorency tart cherries are also grown on the farm. For apple wine, Northern Spy, Ida Red, MacIntosh, Jonathan, and Golden Delicious are grown, which have better acidity than apples grown on the west coast according to Simpson.

Honeywood's loganberry, their largest volume Oregon fruit product, is preferred slightly underripe at 9-10 ° Brix, 1.8-2.0 acid. Rhubarb has little natural sugar, so is picked overripe.

Strawberry can vary between 10-16° Brix with 0.7-0.8 acid, as high sugar as possible is preferred.

Gooseberry when firm and ripe with flavor, will be 9-11° Brix and 1.7-2.0 acid. Raspberry comes in with 9-10° Brix and 1.3 acid. With Blackberry, to achieve the best product, a blend of Marion is used, which comes in earlier in the season with higher acid, and Evergreen which has a lower acid.

Kirkpatrick uses mostly fruit from Lake and Humboldt counties. They prefer Bartlett pears which are slightly green and easier to chop and use a blend of apples.

Soft Bartlett pears with full yellow color are used for **Leelanau** pear wine. Two cherry wines are made from dark, tart cherries; a Montmorency cherry wine, and Morello cherries go into a Festival Cherry wine.

At **Nashoba Valley**, when fruit is ripe, acid level is the deciding factor. Acid in apples drops while in cold storage. 0.2-0.3 acid in apples for cranberry-apple wine is preferred, while apple wine needs about 0.5 acid.

Pear-apple wine needs apples with 0.6-0.7 acid. Pears which must be used fresh, have acid between 0.17-0.3. Pear and apple will have between 10°-14° Brix. Bartlett pears should be slightly green. Peach will be 10°-12° Brix and have acid between 0.7-1.1. Cranberrys average 8° Brix and 2.2-2.6 acid.

Red Haven, Golden Jubilee, and Elberta varieties are blended into peach wine. Different varieties of apples give many different flavors from distinctive to subtle, reports Partridge.

At **Oak Knoll**, fruit must be ripe, but not overripe, ripeness is a misnomer because sugar and acid can be adjusted, according to Vuylsteke. With strawberry, Totems are better than Bentons, Marshall was best for flavor and color, but it had a virus which destroyed the fruit in 3-4 years. There is research being done to look for better yielding fruit that can be machine harvested, reports Vuylsteke.

Harvest criteria at **Paul Thomas** for rhubarb is color. The Crimson variety is preferred over the Victorian variety, for its most intense color. Rhubarb is best harvested at the beginning of the season with high color, low pH and less oxalic acid. Rhubarb has the highest concentration of oxalic acid of any fruit and can cause a crystaline stability problem. Typical pH of rhubarb is 3.1-3.4.

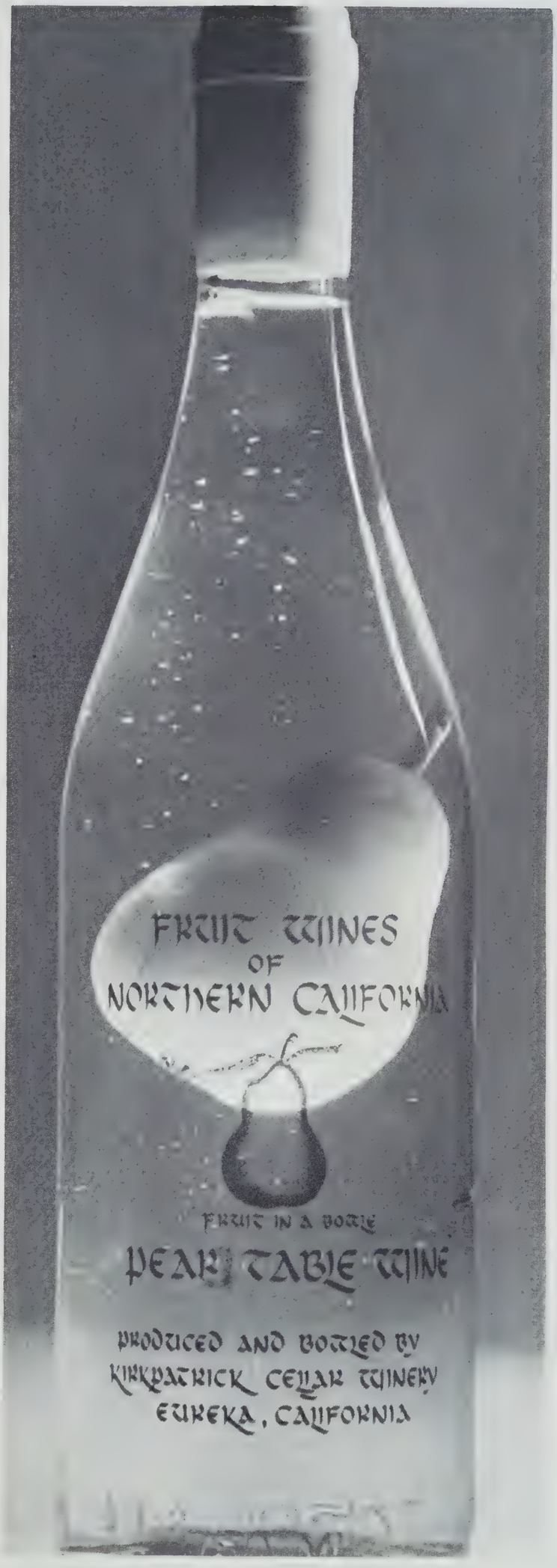
Bartlett pears have improved flavor characteristics over Anjou and Comice varietys. Pears are always used from cold storage, never frozen. Medium ripe pears, are picked just prior to turning yellow on the tree and allowed to turn slightly yellow in the cold room, too ripe pears being difficult to press.

Bing is the variety of cherry, Van is also acceptable, but one should be careful of low acid varieties such as Black Republican, suggests Carter. Carter notes that Montmorency or other sour cherry types produce a wine of entirely different flavors.

For bing cherry dry table wine, picking is very critical, for in one week's time, the flavor, acid, pH and color can change dramatically-acid can drop and pH goes way up. Color ripening of cherry goes from white, pink, red, mahogany, to black. Between red and mahogany is the right time to pick.

Apricots and nectarines should be picked at commercial maturity, when the fruit is just starting to turn ripe, not mushy. Raspberries should be commercially ripe, not over ripe, red not purple.

At **Summerhill**, the Santa Rosa plum variety has the highest flavor, the Gran Rosa variety also works well. Ripe plums have the darkest color possible without rot. They will be about 12° Brix and between 1.8-2.0 acid. Whole plums with pits that have been frozen, break down during thawing and are ready for pulp fermentation. Olallieberry is the best variety to use for blackberry wine.



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What is the fermentation process?

Berrywine Plantation

All fruit fermentations start on the pulp to help extract the juice. We press off the pulp, add necessary sugar to achieve the desired alcohol content when the juice completes fermentation.

Enzyme is used on all fruits to help the extraction process. All fruit wine fermentations are held under 70 °F. SO_2 is added at crush to protect the soft fruit which might have molds in isolated spots while we wait two or more days for a sufficient quantity of fruit to arrive to fill a fermenter.

Plums are fermented with the pulp and pits. Peaches are crushed and pits removed prior to fermentation. Peach pulp is very gelatinous and you must be real careful with peaches, many individual peaches may not be completely ripe.

Buzzard Lagoon Vineyard

Fresh overripe strawberrys were obtained which had about 10 °Brix and 0.3 acid, crushed with a minimum of leaf petals into a fermenter, yeastex and enzyme were added. Acid was added to raise the acid level to 0.8.

Must was ameliorated to 22.5 °Brix with a mixture of cane sugar and water and inoculated with Pasteur Champagne yeast. The batch was fermented to dryness, pressed, settled and racked three times. The wine was cold stabilized naturally while in the cellar and the wine received a tight DE filtration prior to bottling.

Ellendale Vineyards

All fruits are fermented with the pulp, except apple. Apple is hammermilled and pressed and dry sugar added to the juice to have 20° Brix before inoculation with Champagne yeast, the same yeast on all fruits. The goal is 11% alcohol on apple, 12% on other fruits.

Pulp fermentations average three to six days to reach dryness. Rice hulls are used as a press aid, except on apples, where only a jelly bag in the press is used.

Most fruits receive 10 grams/1000 gal. pectinase five fold to break down the pulp and extract color, apple requires 25 grams/1000 gal. to help achieve clarity. After pressing, additional sugar and water to complete fermentation is added all at once. Apple requires about one pound/1000 gal. yeastex added at amelioration.

Fenn Valley Vineyards

120 ppm SO_2 is added at crush to all fruit and the juice centrifuged after pressing. All fruit is chaptalized to 19.5° Brix before inoculation and fermented to dryness in 50-55 °F fermentations and the wine centrifuged to remove the yeast.

A custom built fruit crusher for peaches similar to a hammermill is used, which produces chunks equal to the size of a peach pit, so not to break the pit, and the juice is pressed immediately with rice hulls. We also press apples with rice hulls immediately after hammermilling.

For blueberry, overripe fruit is purchased from the packer(at 1/2 price), crushed in the grape crusher, enzymes added and held on the fruit for 36 hours, then pressed. Blueberry is real low in nitrogen, so about 2 pounds/1000gal of food grade urea is added as a yeast nutrient, apple only needs one pound/1000gal.

Blueberry and apple juice are inoculated with fermivin yeast and Epernay is used on peach juice. Four pounds/1000gal of bentonite is added 1/2 way through fermentation for heat stability and to help yeast settle out.

Good Harbor Vineyards

Cherries are pitted by an Elliott pitter which chops the cherry and removes the bitter inner membrane. SO_2 is added and the fruit frozen to help break up cells in the fruit and get better color extraction. After thawing, we press with the help of rice hulls and add 100 ppm SO_2, add yeastex and inoculate with Champagne yeast, which is the best for cherry on which completion of fermentation can sometimes be difficult.

All fruit wines have pectic enzyme added and we chaptalize cherry juice to 18.5° Brix at inoculation, ferment at about 60°F and let the juice go dry.

Apples and pears are crushed and then pressed with rice hulls and 100ppm SO_2 added, then the juice frozen to be thawed and fermented after the grape wines have left the tanks in the spring. Epernay yeast is used on apple and pear which extracts the fruitier, flowery flavor desired.

Honeywood Winery

Whether fresh or frozen, every product prior to fermentation is heated between 130°-140°F for an average of 24 hours to get more stable color and maximum juice extraction. Fruit products are cooled to a temperature in the mid-70's prior to inoculation. No enzyme is added prior to pressing and Montrachet yeast is used on all fruits and works well under varying conditions.

Rhubarb completes fermentation in about 14 days and is left in the same tank an additional 10-14 days while yeast and fruit solids settle. On other fruits, after fermentation has begun, juice is separated from the fruit and amelioration with water takes place.

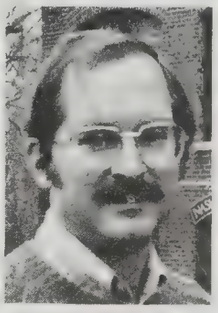
During the first ten days of fermentation, dextrose and water are added separately daily to maintain a steady active fermentation until the predetermined final amount of sugar and water have been reached. Apricot and strawberry rarely receive water additions, just sugar.

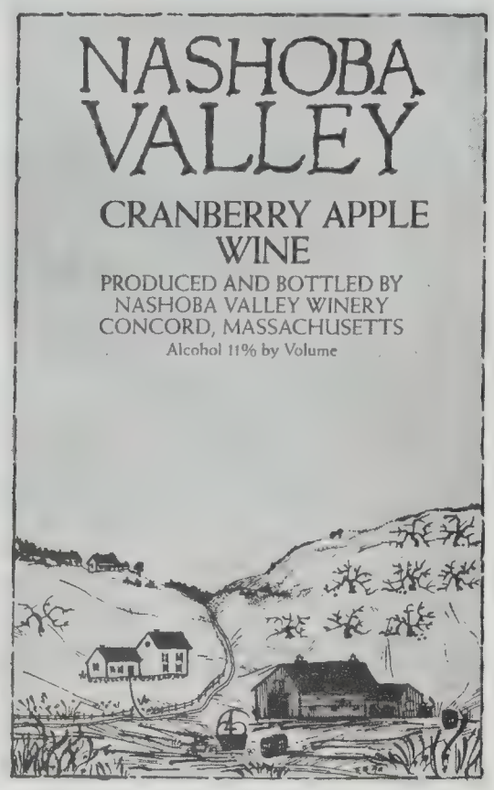
Yeast nutrient is added at inoculation and enzymes are used to help clarify and stabilize the wines. Rice hulls are used as press aids with all fruits in the Willmes bladder press.

Kirkpatrick Cellar Winery

Both apples and pears are crushed and pressed for juice fermentation.

Jack Partridge



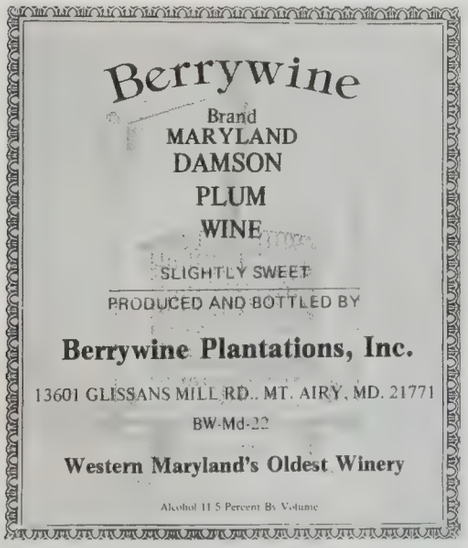


Leelanau Wine Cellars

On all fruits, we use enzymes, yeast nutrient and Champagne yeast which produces less H_2S and falls out easily. All fruits are pressed with rice hulls, fermented on their natural sugar, and then chaptalized to avoid high heat from a large sugar volume. 50ppm SO_2 is added at crush to prevent oxidation and stunt any wild yeast. Juice is settled before inoculation. Fermentation takes place between 58-60°F.

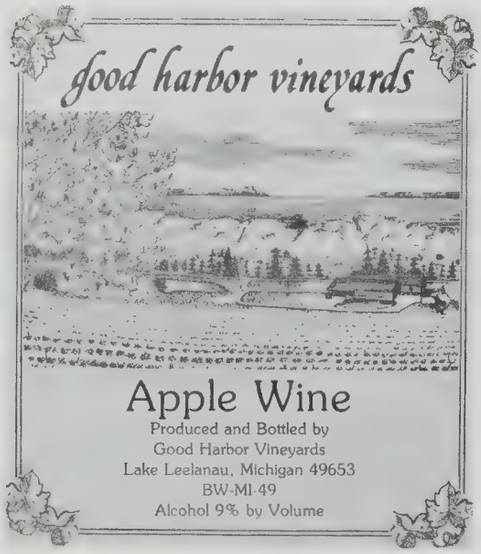
Nashoba Valley Winery

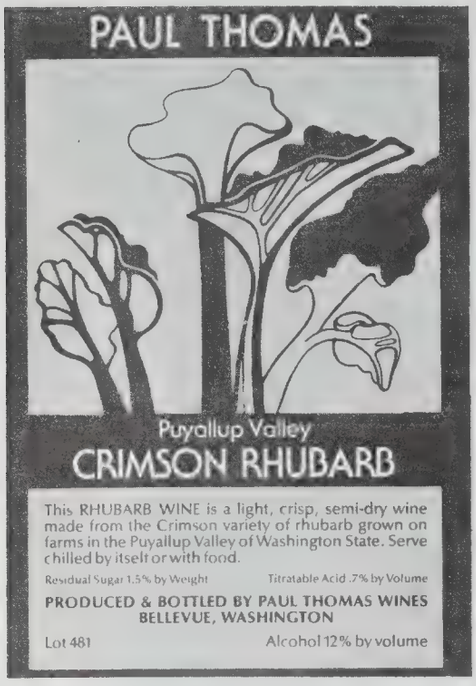
Peaches are put through our custom-built peach pitter to pulverize the fruit, inoculated with Steinberg yeast and fermented on the pulp for a couple of days. Enzyme is added to help break down the fruit and ease pressing. We try to



Anthony Aellen

Bruce Simpson




PAUL THOMAS
Puyallup Valley
CRIMSON RHUBARB
This RHUBARB WINE is a light, crisp, semi-dry wine made from the Crimson variety of rhubarb grown on farms in the Puyallup Valley of Washington State. Serve chilled by itself or with food.
Residual Sugar 1.5% by Weight
Titratable Acid .7% by Volume
PRODUCED & BOTTLED BY PAUL THOMAS WINES
BELLEVUE, WASHINGTON
Lot 481
Alcohol 12% by volume

Brian Carter

keep fermentation under 70°F, dejuice with a rotary screen, press with rice hulls and complete the juice fermentation in the balance of one week.

On pear-apple, we crush and press immediately, inoculate with Chanson yeast and keep the fermentation between 60°-65°F. Blueberry is fermented on the pulp with Pasteur Red yeast in the high 70's during a two-week fermentation.

For cranberry-apple, we crush and press apples to juice, add the juice to frozen cranberrys and warm up the batch to 50°F. Champagne yeast is added and fermentation takes place between 60°-70°F. After one week, the batch is dejuiced and the cranberrys pressed and juice fermentation completes in three weeks.

SO_2 between 50-100 ppm is added at crush to restrict wild yeast fermentation. Yeastex and pectic enzyme are added to all varieties in the tank after crush. Rice hulls and shredded wood fibre are used to help compact yeast lees and fruit particulates after fermentation of cranberry-apple and blueberry wines. A rack and cloth press is used which keeps solids to a minimum.

Oak Knoll Winery

Rhubarb is frozen, thawed and pressed before fermentation. We used to ferment gooseberry with pulp, now only juice. Apricot or other stone fruit is juice fermented. Loganberry is pulp fermented. Pulp fermentation releases all the pectin into the juice which can make clarification difficult.

When you freeze fruit, thawing breaks down fruit, eliminating the need for crushing. Juice fermentation is done in a closed tank, pulp fermentation in an open top fermenter. We add yeast and enzyme at the beginning of fermentation.

Enzymes are added to achieve maximum juice extraction and improve pressing. You must use a narrow based enzyme which will work on pectin only, a broad based enzyme can cause pigment separation after bottling. We use Champagne yeast for light wines and Montrachet yeast for red wines.

If a fermentation is sluggish or difficult, then we would add a yeast nutrient. There is no amelioration until the completion of primary fermentation. Different fruits dictate different levels of dryness in primary fermentation.

We use rice hulls as a press aid in our Willmes bladder press. After pressing, we ameliorate, adding the water all at once, the sucrose in batches to control the temperature of fermentation.

Paul Thomas Wines

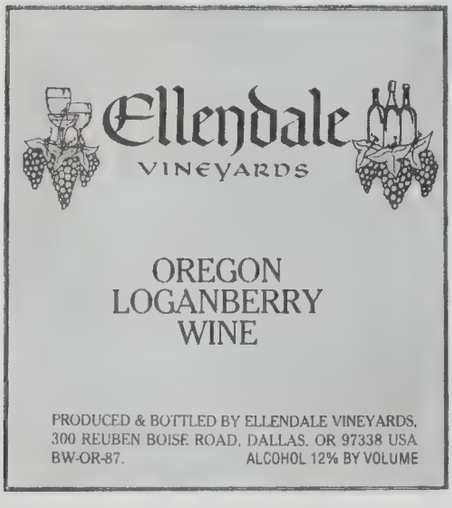
All fruits are vinified by juice fermentation except cherry. Pasteur Champagne yeast is used on all fruits.

Rhubarb is frozen, so that the cellular structure is broken down during thawing. After thawing, no SO_2 is added which would bleach out the color. No press aids such as rice hulls are used on rhubarb in our Europress.

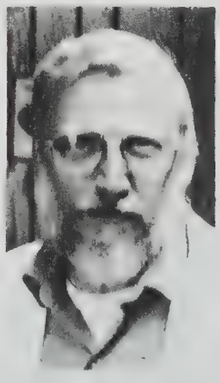
After pressing, water is added to the juice in the tank to bring the acid down to 0.7 and dextrose is added to raise the juice to 22° Brix. Yeastex is added at inoculation. Pectic enzyme is added right after pressing to break down pectin and improve filtration.

A controlled fermentation between 55° and 60°F in jacketed stainless steel tanks takes two-three weeks.

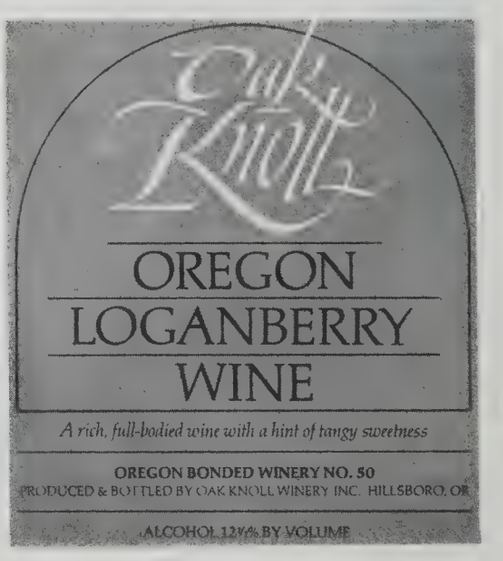
Bing cherry foams excessively during fermentation, so we experimented with low foam Steinberg yeast recently. Cher-



Robert Hudson



Ron Vuylsteke


Oak Knoll
OREGON
LOGANBERRY
WINE
A rich, full-bodied wine with a hint of tangy sweetness
OREGON BONDED WINERY NO. 50
PRODUCED & BOTTLED BY OAK KNOLL WINERY INC. HILLSBORO, OR
ALCOHOL 12% BY VOLUME

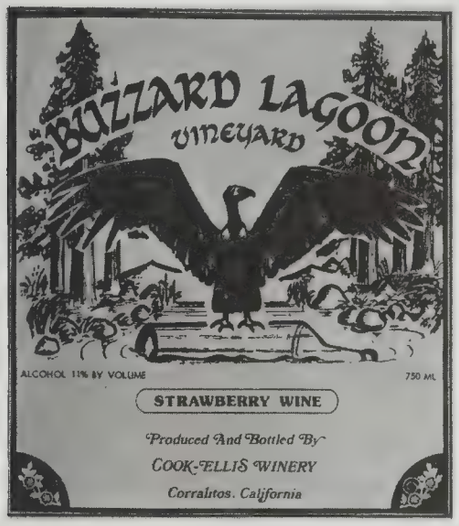
rys are held in a cold house until a sufficient quantity is picked off the trees without stems. Cherrys are crushed in the Demoisy stemmer-crusher at a roller setting which will not crack the pits.

Must in the tank is blanketed with CO_2, enzyme is added to improve juice yield and no yeastex is added. Between six and 24 hours after inoculation (12 hours is average), must is pressed with rice hulls and juice returned to tank for fermentation to be completed to dryness.

Pears are run through a hammermill, mixed with rice hulls and pressed. At pressing, SO_2 is added as pears can present a severe browning problem. pH of pears will be between 3.6 and 4.2, average SO_2 addition is 80-100 ppm, pears with high pH will require more SO_2.

Pears come in about 14°Brix, so dextrose is added after inoculation to raise sugar to about 21°. No water is added. Yeastex is added, as is pectic enzyme after pressing. Fermentation at 55-60°F takes two-three weeks.

Pear lees can present a problem, producing as high as 20% solids. We have experimented with settling and/or filtration of juice before fermentation.



Jim Cook

Apples are crushed and pumped to the basket press at Ellendale Vineyards, Oregon.

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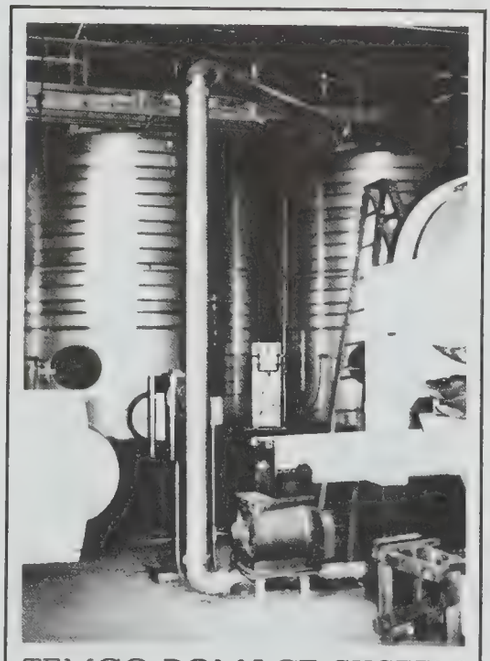


TEMCO POMACE SYSTEM

A problem with apricots and nectarines is removing the pits. Cutting the fruit in half and removing the pit by hand and freezing the fruit is unacceptable. We will try a mechanical pitter at the winery next time, after mascerating the fruit which will not break the pits. Rice hulls are added for pressing.

Apricots have good acid and require addition of water and dextrose. Apricots also have a very strong fruit character. Amelioration and a warm fermentation between 70-80 °F will reduce and mellow the fruit character. Pectic enzyme is added to the juice after pressing for clarification. Nectarines have less fruit intensity and require less amelioration than apricots and are fermented between 60-65 °F.

We would like to process fresh raspberries, but due to picking logistics, we receive them frozen in closed five-gallon buckets. They thaw on the winery floor over about five days and are loaded into the press along with rice hulls. About 50 ppm SO_2 is added to the pressed juice.

The juice is inoculated and enzyme added for clarity. 35% amelioration with sucrose and water is done to raise the juice to about 22.5° Brix. A warm fermentation between 70-80 °F to reduce fruit character takes one-two weeks as maximum fruit character is undesirable when making dry or off-dry wine.

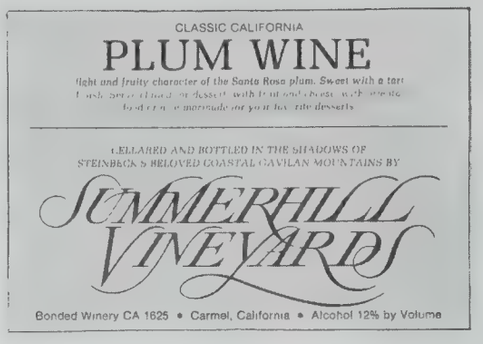
Summerhill Vineyards

We use all frozen fruit that has been thawed in pulp fermentation, which includes apricot, plum, loganberry, blackberry, and strawberry.

A syrup fermentation technique is used. Sugar is added to the fruit to reach 15° Brix, yeast nutrient(diammonium phosphate) is added, and California Champagne yeast is used which has the smallest chance of producing H_2S. Pectic enzyme is added to all fruit to maximize juice extraction.

Alcohol analysis is done daily to monitor fermentation, and upon reaching 8 °Brix, sugar is added to achieve a final alcohol between 12%-13% when the wine has fermented dry. By doing two or more sugar additions, the fruit's sugar level is kept in the yeast's most efficient range for the longest possible time.

Gary Hada


CLASSIC CALIFORNIA
PLUM WINE
CELLARED AND BOTTLED IN THE SHADOWS OF
STEINBECK'S BELOVED COASTAL GAVILAN MOUNTAINS BY
SUMMERHILL VINEYARDS
Bonded Winery CA 1625 • Carmel, California • Alcohol 12% by Volume

Wine is pressed off with rice hulls as a press aid between 2°-4 °Brix so the alcohol will not extract bitterness from pits in fruit like apricot and plum.

How do you finish the wines?

Ellendale blackberry and loganberry wines require about four pounds/1000 gal. of bentonite to achieve heat stability. Apple requires at least 10-12 pounds/1000 gal. of bentonite.

Sourness of fruit is balanced with sugar to achieve a fresh fruity wine; loganberry and rhubarb are real sour after pressing! Rhubarb is finished dry, no sweetening at bottling. Wines receive a DE filtration, sorbate addition of about 1½ ounces/60 gal. and go through a 0.45 micron sterile filter prior to bottling.

At **Fenn Valley**, peach has a real stability problem. Dry wine is aged for over a year to allow proteins to precipitate and then sterile filtered at bottling.

All **Good Harbor** wines receive about two pounds/1000gal of bentonite and sparkaloid, receive two or three filtrations and a membrane filtration prior to bottling.

All **Honeywood** wines receive a rough DE filtration and a pad filtration. Wines are pasteurized and bottled with about 135 ppm total SO_2. Consumption is recommended within six months-two years after bottling, or soon as purchased.

After completion of fermentation at **Leelanau**, wine is racked off and receives one-two pounds/1000gal of Sparkaloid and bentonite. Wine is filtered three times and once again at bottling. This past year, silica sol was used on pear wine to reduce a protein haze.

Bentonite is used to help clean up **Nashoba Valley** peach wine and minimize the rough filtration necessary. SO_2 levels after fermentation are adjusted to 30-50 ppm free.

Dry, white wines and dry blueberry are aged in American oak barrels to round out the flavor, pick-up a little oak, and reduce fruitiness. Oak ageing has taken two-six months, depending on oak pickup and the wine's development. Fruitier wines are aged in stainless steel two-four months.

Dry and sweet blueberry wines receive coarse filtration, all others receive polish filtration. Wines are bottled with 50 ppm free SO_2 and sorbate between 200-220ppm is added to all sweet wines at bottling.

Peach wine after fermentation goes through a pattern according to Partridge. In fermentation, a macaroon aroma appears and is present through a couple of wine movements.

Two months after fermentation, a grapefruit flavor and a greenish tint appears and goes away a month later when the peach aroma develops. Peaches are a headache to sort before pitting in order to use only ripe peaches.

Cranberry-apple ages to clarify and develops a minty-candyish aroma. Most of the fruit wines are ready for con-

sumption one month after bottling. Dry and sweet blueberry will continue to mature in the bottle for two or more years into softer, new and different flavors and aroma, and it becomes a more vinous wine.

All **Oak Knoll** varieties are centrifuged after fermentation, DE filtered in a pressure leaf filter and receive a final pad filtration. Sorbate and SO_2 is added to stabilize the wine and prevent refermentation. Wine is sweeetened with sucrose prior to bottling. A month of bottle age and consumption within a year is recommended.

Oxalic acid in rhubarb is removed by addition of calcium to the **Paul Thomas** wine. Fermented rhubarb is settled for one week after pressing. Wine receives DE filtration in a pressure leaf filter, followed by a polish filtration and is EK filtered prior to bottling. Rhubarb wine is sweetened with sucrose to 1.2% residual sugar.

The wine is blanketed with nitrogen prior to bottling and bottles are sparged with nitrogen at bottling because no SO_2 had been added during processing. Rhubarb will not age for a long period, six months-one year after bottling would be a maximum for good fruit character.

After pear is fermented, the wine is adjusted to 30 ppm SO_2. Pear sometimes requires acid addition before bottling. Citric within the legal limit of two grams/liter has been added. Sucrose is added at bottling to achieve 0.8 residual sugar and bottle with 25 ppm SO_2. Wine is sterile filtered through a cartridge filter.

Cherry lees after fermentation are a big problem. Carter notes you have to settle longer and filter harder with rough and polish filtration. After fermentation, wine is adjusted to 30 ppm SO_2. No sucrose is added at bottling and the wine is sterile bottled. SO_2 at bottling is about 25 ppm depending on the pH. Cherry ages very well, up to three years or more.

Doug Welsch

SERVE COLD
Fenn Valley
FENNVILLE
Peachwine
A SEMI-DRY NATURAL PEACH TABLE WINE
Enjoy this mellow fruity wine
with informal meals or by itself, "on the rocks",
or in zesty fruit punches and drinks.
PRODUCED AND BOTTLED IN OUR NATURALLY COOL CELLARS BY
FENN VALLEY VINEYARDS • FENNVILLE, MICHIGAN 49408

Raspberry wine is adjusted to 25 ppm SO_2 after fermentation, settled, rough and polish filtered. Raspberry, a relatively simple fruit wine, has no lees problem. It is sweetened to 2% residual sugar with sucrose and sterile bottled with 20-25 ppm SO_2. Raspberry may hold up in the bottle one-two years or longer while maintaining its light, fruity character.

Carter notes you cannot do a ripper SO_2 analysis on raspberry in juice or wine as the pigments give a false reading. He recommends using the aeration-oxidation method for SO_2 analysis.

Carter emphasizes that cleanliness with fruit wines is very

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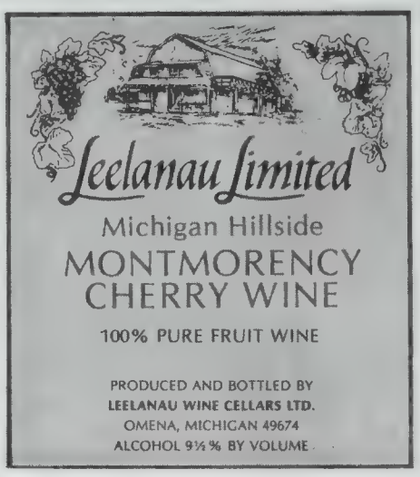

important due to the high pH in the must. Cherry, pear, and rhubarb are almost entirely malic acid. If they go through malo-lactic fermentation, the acid will drop quite a bit and the pH goes up quite a bit!

After **Summerhill** wines have reached dryness, they are racked off, settled, racked off and rough DE filtered. To achieve heat stability, plum and apricot wines require about 2-4 pounds/1000 gal. of bentonite.

Loganberry and blackberry are color unstable, in order to avoid throwing color pigment in the bottle, about one pound/1000 gal. of decolorizing carbon along with six-seven pounds/1000 gal. of bentonite to stabilize the color longer is added.

Quite often, Sparkaloid is added with bentonite to compact lees and improve clarity prior to filtration. Wines are settled after the bentonite addition and depending on the wine's clarity, a medium and/or tight pad filtration is done.

Wines are sweetened with sugar and sorbate is added to prevent refermentation prior to tight filtration just ahead of bottling. Hada recommends fruit wines be consumed immediately.

Apricot has several problems. It is more difficult to start fermentation; it requires larger amounts of yeast than other fruits. When you finish fermentation, you have 2/3 clear wine after pressing and settling, and 1/3 pulpy nectar(lees)-a high loss!

Apricot often completes fermentation at a lower alcohol, giving you less stability. Hada wants 11% or higher! After filtration, apricot wine is opalescent and has colloidal problems; enzymes and a real tight filtration will eliminate them.

FRUIT WINEMAKING SUMMARY

WINERY	FRUIT	FRESH OR FROZEN	PULP OR JUICE FERMENTATION	ENZYMES	YEAST	FILTRATION
Berrywine Plantations Anthony Aellen	cherry, peach, plum, raspberry	fresh	pulp and juice	yes		
Buzzard Lagoon Vineyard Jim Cook	strawberry	fresh	pulp	yes	Pasteur Champagne	tight DE filtration
Ellendale Vineyards Robert Hudson	apple, blackberry, cherry, rhubarb, plum, strawberry	fresh and frozen	pulp – except juice for apple	yes	Champagne	DE filtration sterile filtration
Fenn Valley Vineyards Doug Welsch	apple, blueberry, peach	fresh	juice	yes	fermivin – apple, blueberry Epernay – peach	sterile filtration
Good Harbor Vineyards Bruce Simpson	apple, cherry, pear	frozen	juice	yes	Champagne – cherry Epernay – apple, pear	2 or 3 filtrations 1 membrane filtration
Honeywood Winery Bill Wrey	blackberry, gooseberry, loganberry, rhubarb, raspberry, strawberry	fresh and frozen	pulp and juice	yes	Montrachet	rough DE filtration pad filtration pasteurization
Kirkpatrick Cellar Winery Robert Kirkpatrick	apple, pear		juice			
Leelanau Wine Cellars Ed Van Dyne	cherry, pear		juice	yes	Champagne	4 filtrations
Nashoba Valley Jack Partridge	apple, peach, pear/apple, cranberry/apple, blueberry	fresh and frozen	pulp and juice	yes	Steinberg – peach Champagne – cranberry/apple Chanson – pear/apple Pasteur Red – blueberry	coarse or polish filtration
Oak Knoll Ron Vuylsteke	loganberry, strawberry	fresh and frozen	pulp and juice	yes	Champagne – light Montrachet – red	DE filtration pad filtration
Paul Thomas Wines Brian Carter	cherry, pear, rhubarb	fresh and frozen	pulp and juice	yes	Pasteur Champagne	DE filtration pad filtration sterile filtration
Summerhill Vineyards Gary Hada	apricot, blackberry, loganberry, plum, strawberry	frozen	pulp	yes	Champagne	rough DE filtration tight filtration

VENDOR UPDATE

ROBERT L. STOLLENWERK CO.

Robert L. Stollenwerk Co. has moved to a new office and new 10,000 sq. ft. warehouse to hold a larger supply of corks, filter pads, oak barrels, and reconditioned used equipment. The company's inventory has been computerized to better service winery customers. Robert L. Stollenwerk Co. is the Eastern representative for The Moffet Co., Inc. who handles the Willmes presses and other equipment. The mailing address and phone remain the same: Robert L. Stollenwerk Co., PO Box 282, Egg Harbor City, NJ 08215, (609) 965-0074.

VENDOR ADDITION

LaFITTE CORK & CAPSULE CO.

LaFitte Cork and Capsule, serving the European wine industry for four generations, has opened a capsule manufacturing and cork processing plant in Menlo Park, CA to better serve U.S. needs.

LaFitte offers PVC shrink capsules in sizes to fit 750ml and 1.5liter bottles. Currently, four stock colors are available from Menlo Park; gold, yellow, burgundy red, and matte green. The plant in France offers over 30 stock colors, and the stock color offering in Menlo Park will be expanded accordingly.

Orders for custom colors, size, and printing are accepted. Minimum order for custom printing is 100,000. Rotagravure printing equipment in the Menlo Park facility should be operating soon. Capsules are available with the option of perforations or tear tabs.

Custom orders are also accepted for polylaminate and aluminum capsules manufactured in Menlo Park.

Four grades and three sizes of corks are available. Grades are super select, extra first, first, and second. Sizes are 1½", 1¾", and 2". Corks can be paraffin or silicon coated and sterile bagged in 1,000's. LaFitte can custom print corks.

5,000 is the minimum order for corks or stock capsules. More information is available from Robert J. Pharisien, LaFitte Cork & Capsule, Inc., 1180 Hamilton Ct., Menlo Park, CA 94025 (415) 322-1838.

BARREL BROKER UPDATE

LES TONNELLERIES de BOURGOGNE

Vincent Bouchard, international sales representative for Les Tonnelleries de Bourgogne has announced changes in his product line. In addition to coopers: Billon, Remond, and Damy in Burgundy, France; Bouchard now also represents Tonnellerie Vicard in Cognac, France.

Winemakers may order 225 liter Burgundy export or chateau barrels and 225 liter Bordeaux export barrels from any of the four coopers in light, medium or heavy toast, and a choice of woods: Allier, Burgundy, Limousin, Nevers, Troncais, or Vosges.

225 liter Bordeaux Chateau barrels or any barrel over 60 gallons including 500 liter puncheons are available in the same choice of woods from Tonnellerie Vicard.

Tonnellerie Vicard can deliver oval or round or straight tanks made of Troncais oak in any size or shape. More information is available from the U.S. representative, David Adelsheim, Adelsheim Vineyard, Rt. 1, Box 129D, Newberg, OR 97132 (503) 538-3652.

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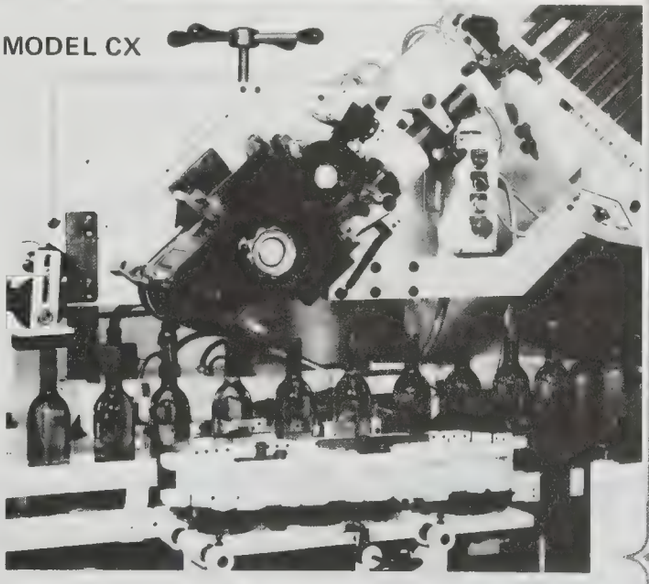

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AVF Research

Nine one year research projects are underway, funded by the American Vineyard Foundation from their first fund raising drive which collected over $129,000, according to Zelma Long, president, the foundation's project funding committee, composed of six winery members and six grape grower members from the Board of Directors, chose nine projects from 38 submitted in 1982 from California, New York, Ohio, Pennsylvania, and Washington.

Five projects in viticulture and their leaders include: Control of eutypa dieback disease of grapevines, Amand Kasimatis; Pesticide interaction in nematode control of grapes, David R. Viglierchio; Somatic cell genetics of **Vitis**, Carole P. Meredith; Production of grapevine rootstocks resistant to vineyard pathogens, L.A. Lider, C.P.Meredith, A.C. Goheen, D.J.Raski, J.Granett; and Cause and cure of water berry/stem drying in table, raisin, and wine grape varieties, W. Mark Kliewer. Total viticulture research funding is $76,525.

Four projects in enology include: Alternative pathways of sugar utilization for overcoming sluggish vinifications, R.E. Kunkee; Investigation of Wine Yeast-Growth and fermentability of commercially used Saccharomyces yeast species and strains, Cornelius S. Ough; Identification of highly dilute amines and sulfides in wine headspace, John Almy; and Factors affecting formation of histamine and other biogenic amines, Cornelius S. Ough and R.E. Kunkee. Total enology research funding is $52,850.

Long reports that the foundation is asking for donations from growers and winerys respectively, of three cents per $100 of each ton crushed in 1982 to continue research project funding. "In addition to that, we would like to raise special funds from auctions, estates, trusts, wine industry grants, etc. to begin to provide for an endowment fund," adds Long. The fund raising committee also is seeking funds from members of allied industries such as banks and glass companies.

Dr. Cornelius Ough of U.C. Davis, notes that the amount of financial support available to all universities doing viticultural and enological research is not keeping pace with the growth of the industry. "In fact, if one considered the value of the grape and wine crop, we as an industry contribute a tenth as much per dollar value of the crop to support research in enology and viticulture as the fruit and vegetable crop industry provide for their own research support," adds Ough.

George Vare, AVF executive director, reports that 1983 research projects will be chosen by July 1. For more information, contact the AVF office at 331B World Trade Center, San Francisco, CA 94111 (415)986-6330.

IN THE CELLAR with Jake Lorenzo

ed.note: Jake Lorenzo is a private investigator in Sonoma specializing in high-society murders. Unfortunately, most of his income is derived from divorce cases usually involving people in the wine business. Many of these customers pay for these services with wine, therefore Jake is truly an expert.

Talk to a winemaker. He'll set down his wineglass and tell you, "It's all in the grapes! Good grapes make good wine. Bless the grape grower!"

Talk to a grapegrower. He'll take a piece of straw out of his mouth and tell you, "Shucks, I just grow the little fellers. That there winemaker, he's the one turns 'em into wine. Bless the winemaker!"

If makes for nice PR but it's hardly reality. The true relationship between grapegrower and winemaker is far from the idyllic one they would have us believe! In fact, grapegrowers and winemakers are constantly at war. The heart of the conflict revolves around economics and battles rage over the complex system of payment. Only the ability to negotiate an equitable peace makes for fine wines.

The whole thing starts peacefully enough. The grower and winemaker enter into a deal. The grower will grow the best wine grapes in the county and the winemaker will take those grapes and make the finest wine to ever grace the inside of a bottle.

Since the grower is going to grow the best grapes in the county, the winemaker generously offers him $500.00 per ton instead of the going rate of $450.00. The grower, not to be outdone by this generosity, tells the winemaker that he will do whatever the winemaker wants to assure that his grapes live up to their rightful destiny.

That's fine with the winemaker who just happens to have a few suggestions. You see, winemakers know that the best wines come from low yielding grapes. With healthy vines, lower yields mean more intensity in the grapes, higher sugars, better acids and more varietal character. He explains all this to the grower and pours more wine to prove his point.

The grower looks at the winemaker like he's got a case of sunstroke. "You want me to grow less grapes?"

You see, the grower is sitting on a 100 acre vineyard which cost $7,000.00 per acre to develop, NOT counting the price of the land, with maintenance costs of $800.00 per acre per year.

He pushes aside his glass of wine, pours himself a bourbon and water and explains that a $700,000.00 investment with fixed costs of $80,000.00 per annum requires that he produce four tons per acre, just to break even.

The winemaker groans, "Four tons per acre and I'll be lucky to make jug wine. I'm talking gold medals here. I'm talking blue ribbons. I'm talking your vineyard on the label!"

"Vineyard designation is nice, but the only way I can do it is with a bonus. I could cut the yield, but you'd have to pay 1% bonus for each tenth above 22° Brix up to a total 20% bonus," responds the grower.

"Alright you cutthroat, but if you overcrop or pull any of that summer irrigation, it's going to cost you 1% penalty for each tenth below 22° Brix up to a total 20% penalty," responds the winemaker.

It goes on and on throughout the growing season. They argue about how many canes are left on each vine, how many buds are left on each cane, how many times and when the vineyard is irrigated. They fight about the sugars and the acids, when to pick and how to pick, and finally, they argue about the test sample.

The winemaker will tell you that if it wasn't for his genius the grapes wouldn't have made decent vinegar, let alone wine. The grape grower will tell you that his grapes were so good a chimpanzee could have won medals.

Maybe it's not a war. Perhaps we should look upon their relationship as a system of checks and balances. When the checks don't bounce and the balances work out just right, then we all enjoy the fruits of their labor.

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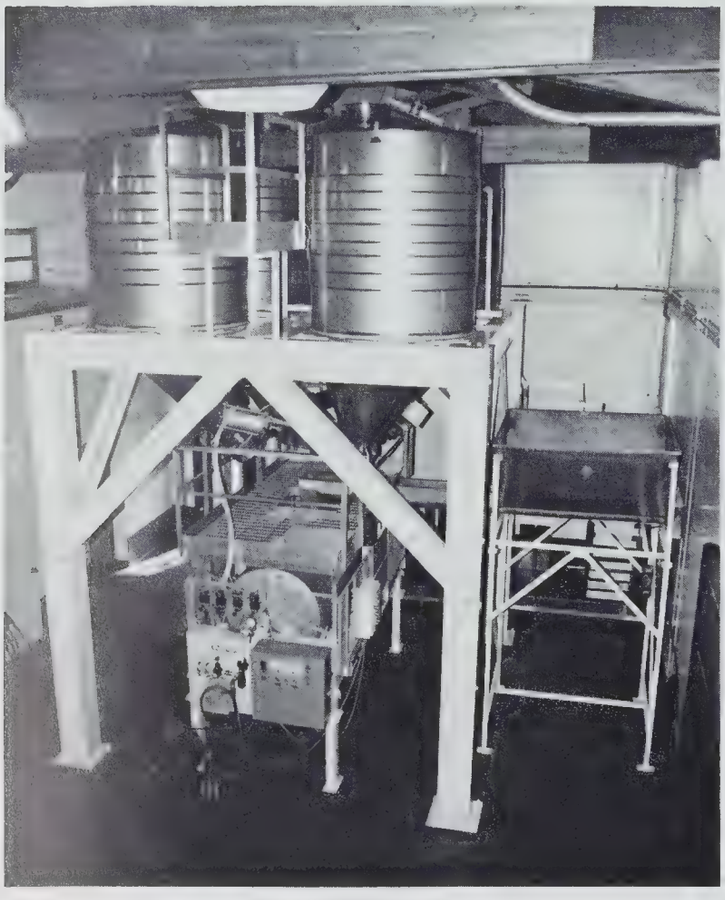

FERMENTED SKINS TO A TANK PRESS?

Jack Stuart of Silverado Vineyards, Napa, CA has answered the question of how to get fermented red grapes to a tank press which has four 1250 gallon drain tanks positioned overhead, making access to the press difficult.

Stuart had Winery Equipment Systems of Napa, CA, build and place a hopper with a horizontal auger and extension to feed grapes into the press at the side of the press/drain tank station. Fermented grapes are put into a 4' X 4' X 3' stainless steel racking tub from the fermenting tank and a forklift with bin dumper attachment takes the grapes to the hopper and dumps.

The hopper holds two-three tubs of grapes for loading to the press. The 2500 liter tank press takes seven tons of red skins and in two or three press loads, processes Stuart's 4500 or 6000 gallon fermenter of grapes.

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PLATE FRAME LEES RECOVERY

In the 1982 crush, Lee Smith, owner-winemaker of Forgeron Winery in Elmira, Oregon, using a method developed by his enological consultant, Bill Nelson, recovered significant volumes of wine from yeast lees with only a plate frame filter and mixing tank.

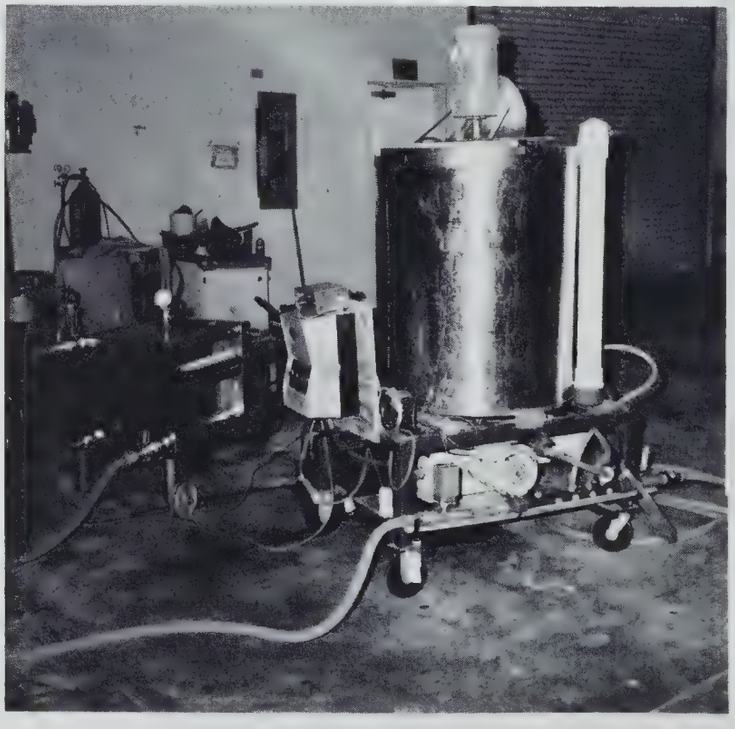
Nelson referred to a Seitz paper on wine lees processing and with a high-low pressure switch, made existing equipment do the job without obtaining a lees filter press. The following procedure was used:

Sixty gallons of yeast lees was placed in a ninety gallon mixing tank and mixed with about ten pounds of medium grade diatomaceous earth for several minutes. Meanwhile, the nine-40cm plate frame filter with Seitz 0400 double pads was precoated with a mixture of three parts DE and one part Fibre-floc in 50 gallons of filtered water. All water was removed from the plate frame by CO_2 gas pumped into the intake.

The de-lees mixture was pumped into the plate and frame filter using a DE injection pump. After achieving a pressure of forty-three pounds, the pressure was maintained between 30 and 43 pounds with a high/low pressure switch actuating the injection pump set to low flow rates of about 0.2 gpm. A 60 gallon batch was processed in a 12-18 hour cycle. Nelson also recommends a pressure-actuated relief valve in case of electrical failure.

Smith recovered 48 gallons of wine from the first racking of red lees and 41 gallons from white lees from the 60 gallon lees batch. Smith racked a second time three-four weeks later and recovered 35 gallons on red and 32 gallons on white lees from a 60 gallon batch.

Smith applied the technique to all grapes he vinified including Cabernet Sauvignon, Chardonnay, Chenin Blanc, Pinot Gris, Pinot Noir, and Riesling.



IDEAL LABORATORY

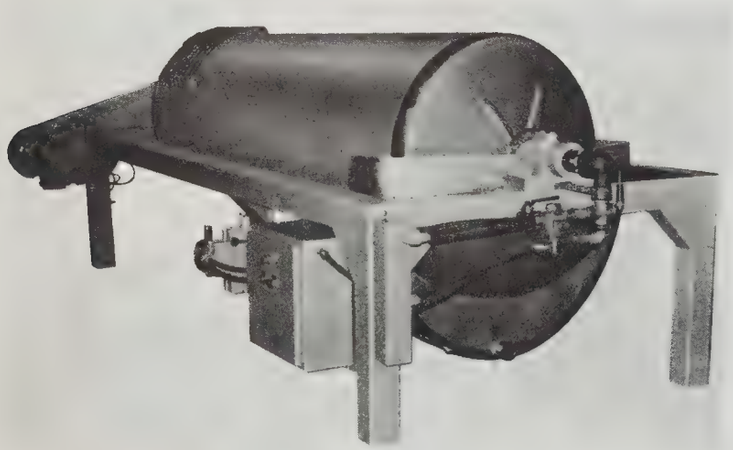
Cakebread Cellars, a 50,000 gallon winery, in Rutherford, CA, recently completed their laboratory and **Practical Winery** believes it to be an ideal setup for a small winery to study.

Rosemary Cakebread, lab technician, who has worked in the Inglenook laboratory after her U.C. Davis education, designed the layout.

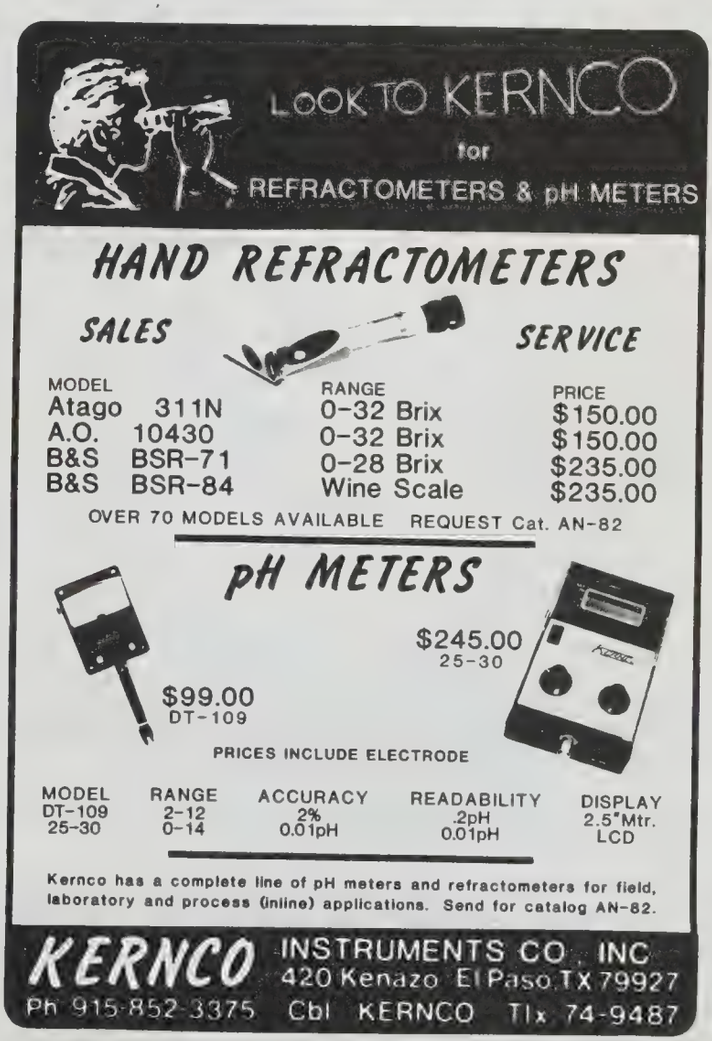
She pointed out the following features: located above the six 25ML burrettes are five two-liter flasks to hold the following chemicals for gravity flow to the burrettes; 0.1 N sodium thiosulfate .010 normal for SO_2 analysis for red wines; sodium hydroxide .01667 normal for volatile acidity analysis; sodium thiosulfate for residual sugar analysis; iodine for ripper analysis; 0.10 sodium hydroxide for total acidity analysis, 0.01667 sodium hydroxide for volatile acidity.

Next to the burrettes is a cash still and an aeration-oxidation apparatus for analysis of sulfur in red wine, preferred by Cakebread over the ripper analysis method. Under the counter is a vacuum pump and a low-flow disposable cartridge ionxchanger water purification system.

All of the items are familiar to wineries except for the aeration-oxidation apparatus which was custom-made by General Glassblowing Co., Richmond, CA. The economical water purification system is made by Illinois Water Treatment Co, Rockford, Illinois and available from King Industrial Sales Co., Walnut Creek, CA.



STOLL SYSTEMS DESIGN has redesigned their American-made diaphragm tank press. The 2600 liter press has a Texas Instrment programmable controller and has an axial filling joint to allow rolling of the press while loading to increase free run drainage and even loading. An electric hydraulic lifting system tilts the press to facilitate rapid unloading of dry pomace through the gate located at one end of the press. More information is available from Hubert C. Stollenwerk, Inc., P.O. Box 314, Egg Harbor City, NJ 08215 (609) 965-0686 or The Compleat Winemaker, 1219 Main St., St. Helena, CA 94574 (707) 963-9681.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CASHFLOW—Savior of the Wineries & CHECKS-IN-THE-MAIL

By Denis Kelly and Richard Fox

THOSE #@%¢ CHEEP EUROPEAN IMPORTS ARE WASHING OUR WINES AWAY!!
IF THIS KEEPS UP WE'LL HAVE TO SELL THE CABERNET TO TRADER JACK!!
DID YOU HEAR THAT SAM? WE'RE GOING TO BECOME PART OF REAGAN'S RUBBLE!
OFFICE
I HEARD IT BILLY! ONLY SOME SUPER-HEROES CAN SAVE US FROM THE SOUPLINE!
RRRiPP!
PUMP
UH-OH!! Billy BENTONITE TURNED THE VALVE THE WRONG WAY!

Billy Bentonite and Sam S. O'Toole hear the fateful news

ZOUNDS! Cellar-Rats are transformed into Super-Heroes who will save American Wine

Our heroes streak across the sky on their way to the capitol to right the wrongs of U.S. Wine!

I'VE SEEN LOBBYISTS... BUT SUPER-LOBBYISTS?
SENATOR SAGGLES, A NEW AGE OF LOBBYING IS UPON US!
GIN
HARD STUFF
STORY: DENIS KELLY
ART RICHARD FOX ©'83

Fat Cats assemble for the afternoon's hooch. Look up in the sky, it's CASHFLOW and CHECKS-IN-THE-MAIL!

(ed. note: Practical Winery welcomes CASHFLOW, story by Denis Kelly, art by Richard Fox.)

It's rough times in the American wine business and tales of woe reverberate among the barrels and vats from Temecula to the wilds of farthest Mendocino, Yakima Valley to Chesapeake Bay. It seems everybody has plenty of wine, but nobody has any cash.

The Great Wine Boom hasn't exactly burst, but there's a steady leak somewhere and something less than euphoria reigns among American winemakers.

A flood of subsidized cheap wines from Europe's wine lake hasn't helped much and many a winemaker dreams as much about cashflow as he did a year or so ago about making the

definitive American Pinot Noir. We first meet our heroes in a medium sized winery tucked away among the hills above . . .

Two stalwart cellar rats, Billy Bentonite and Sam S. O'Toole rack an odd lot of wine found recently in the back of the barrel room. Strange sounds rumble in the vat and they see a faint glow, a vinous penumbra around the wine. Suddenly from the office they hear fateful words. Stunned by the news, Billy, none too swift at the best of times, turns the valve the wrong way and . . . KABLOOIE!!!

Zounds! A transformation has occurred that will have a lasting effect on the American wine industry(not to mention Billy and Sam). These two meek, well meaning but ineffectual cellar workers have been transformed by the magic power of the Electromagnetic Force created by autolysis of the lees from grapes grown above a hidden pitchblend patch into...CASHFLOW: Savior of the Wineries! and his ever present faithful companion CHECKS-IN-THE-MAIL!

Faster than a Speeding Import, more powerful than an Eastern Distributor. Look, from the lees arise our HEROES who will do battle with the forces that threaten a great group of guys and gals (not to mention grapes, barrels, centrifuges, tanks, glycol, ammonia, crusher-stemmers, presses, boots, brushes, squeegees) in short, THE WHOLE AMERICAN WINE INDUSTRY!

Our heroes are on their way to Washington D.C. to right the wrongs of American Wine. They have discovered that they possess powers hitherto unknown to men or heroes:

Ability to soar through the air(actually, no big deal!), X-Ray Vision (O.K., but if you've seen one, you've . . .) Superhuman Strength (so . . . look at the Hulk!) and Instant Solvency (what?? You mean he can . . .)—Yes!

CASHFLOW can with a word (copyright, of course) Pay All Bills and sell three vintages at one time to the Central Patagonian Medical Amigos De Vino(and other groups he alone knows) at RETAIL with NO discounts and for CASH-UP-FRONT! CASH, mind you, hence, of course, the name. The Catch?

He can only do this once every net thirty days and with how many bonded wineries in the USA?? Many have found that his faithful companion CHECKS-IN-THE-MAIL is easier to call on for help. So many have discovered the power, perhaps even stronger than our hero's and certainly more convenient of CHECKS-IN-THE-MAIL!

The Fat Cats have assembled for their daily Governmental Gathering: The-Cocktail-Party. No American wine of course, perhaps a bottle or two of Chateau Zipcode or a glass of Cooperative di Gran Lago di Vino among the martinis. Suddenly, as Senator Saggles, Representative Boondoggle and Judge Letemgo hit the hardstuff, our heroes appear in the sky over the Capitol.

Above them, like the sound of Roland's horn at Roncevalles, like the cross of Constantine blazoned above the next thousand years are the words: CASHFLOW: Savior of the Wineries and, of course, CHECKS-IN-THE-MAIL!

Will they be able to stem the tide of subsidized imports? Will the fat cats awake to the peril facing the industry? Will American Wine be saved? Tune in next time and find out about the adventures of two all-around good guys who will turn the valve the right way again and make the wine(and the cash) flow!

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Commercial Sterilization of Wine Corks

by Dr. Terry Lee
summarized by Bill Preston

Growth of wine consumption has, in recent years, called attention to the microbiological status of cork closures. Over the past two years, Drs Terry Lee and Graham Fleet of the School of Food Technology, University of New South Wales, together with their students Craig Davis and Noelene Daly, have undertaken studies of the microflora of corks and the effect of commercial sterilization thereon.

Results of some of their work have been reported in the **Australian Grapegrower & Winemaker** and the **American Journal of Enology and Viticulture.**

Below is a synopsis of the findings.

The Lee studies address three areas: 1) microflora of wine corks, 2) testing the sterility of wine corks, 3) efficacy of sulfur dioxide treatment of wine corks.

Many microorganisms in cork may have detrimental effects on the quality of bottled wine. Growth of these organisms within the cork prior to insertion in the bottle may result in the generation of metabolites that may leach into the wine causing 'off' flavors. Contaminants such as bacteria and yeasts may also enter the wine and cause spoilage of the bottled wine. Despite the presumed importance of cork microflora in relation to wine quality, suprisingly few studies have been made on the subject. Some attention has been given to molds, but practicaliy none to the presence of yeasts and bacteria in wine corks.

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There are no known data on the microflora of freshly harvested cork, and a year or more can elapse between the harvesting of cork and the production of stoppers. The potential for external contamination is considerable during this period.

Risk of contamination escalates dramatically after processing, in that finished stoppers must be stored and then transported, in some instances great distances, for ultimate use.

Lee refers to French studies of molds present in the lenticel tissue of corks transported from Portugal to France in bales of l0,000 corks. Molds were found in l00% of the bales.

One mold was isolated as responsible for blue-gray discoloration of corks in bales which experienced an increase in moisture content. This problem frequently occurred with the use of non-perforated plastic bales.

Molds were also isolated from corks that had been in contact with wine. Resulting data are inconclusive: l) corks taken from wine that were moldy tasting, were either free of molds or lightly contaminated; 2) corks taken from bottled wine, particularly that part of the cork in contact with wine, were largely sterile and showed that spores of molds did not survive on prolonged exposure(l8 days) to wine.

These studies provide only circumstantial evidence that mold in corks may be responsible for 'off' flavors, and that non-microbial sources may be implicated.

Lee goes beyond molds, and reports on the identities and levels of yeasts, bacteria and molds found in corks imported into Australia. Data come from three separate trials.

First, a preliminary trial in which the levels of molds, yeast and bacteria were assessed in replicate lots of four corks from two separate bales during processing of corks to provide sterile packs of 1000 corks. Second, the determination of mold counts in 25 individual corks selected at random from one bale. Third, a more extensive sampling in which five subsamples of ten pooled corks per bale were examined from each of five bales.

Molds were detected in all corks examined. There was great variation in mold counts of corks between and within the trials. This probably reflects the conditions under which the cork was cut and processed and the subsequent mixing together of corks cut from several areas.

Wide variations in yeast and bacterial counts were also noted in the corks analyzed. Incidence of yeasts in the corks was very low and it would appear that yeasts are not part of the true microflora of cork.

Distribution of bacteria was much broader than that for molds and yeasts; however, the level of bacterial contamination was much less that that of molds. The bacterial flora of corks has not been investigated, but the frequent isolation of **Bacillus** from corks in Lee's studies would indicate that this genus is a significant part of the total microflora of corks.

To ensure that corks are free of microorganisms that may grow in wine, cork merchants either treat corks with generally gaseous SO_2 or ionizing radiation. Whichever treatment is selected, winemakers should have available a check for the efficacy of the treatment.

Lee reports on the Rankine and Pilone method which has been used in Australia. Essentially this technique recovers the microflora of cork samples by a vacuum infiltration process

using sterile saline. Two approaches were made, one qualitative, in which the corks were vacuum infiltrated with a dye, and the other quantitative, in which known counts of **Bhemeonostoc oenos** and **Saccharomyces cerevisiae** were infiltrated into sterile corks and then covered in a peptone-Tween 80 solution.

No viable organisms were recovered from inoculated corks. Studies indicate that the Rankine-Pilone method for checking the sterility of wine corks recovers greater than 70% of the inoculated yeast or bacterial cells from the corks. This would indicate that the method is suitable for the quantitative analysis of corks and can be extrapolated to commercial evaluation.

Finally, Lee evaluated a commercial SO_2 cork sterilization treatment. Again, corks transported from Portugal to Australia were sampled after processing that introduced moisture and a paraffin-based coating to the corks.

The treatment was most effective in reducing the viable mold count of the corks; initial counts of 10^6-10^77 mold colony forming units (CFU)/cork were reduced to less than five CFU/cork after treatment. In two samples, no CFU were detected following treatment. SO_2 was not as effective against bacteria, however the levels of bacteria per cork were much lower than that of mold. In some samples, the counts were reduced by as little as 50%. Yeasts were so rarely detected before and after treatment that no inactivation factor could be derived.

While the SO_2 treatment achieved nearly 100% inactivation of the molds present in corks, it should be remembered that mold is not the sole cause of cork related 'off' flavors in wine. Nonetheless, SO_2 treatment was shown to be effective against molds and to a degree on bacteria. Obviously, further studies are needed.

Literature summarized:

Davis, C.R., G.H. Fleet, and T.H. Lee. The microflora of cork. **Aust. Grapegrower & Winemaker** (208):42, 44 (1981).

Davis, C.R., G.H. Fleet and T.H. Lee. An appraisal of the Rankine-Pilone method for testing the sterility of wine corks. **Aust. Grapegrower & Winemaker** (208):56 (1981).

Davis, C.R., G.H. Fleet, and T.H. Lee. Inactivation of wine cork microflora by a commercial sulfur dioxide treatment. **Am. J. Enol. Vitic.** 33:124-127 (1982).

Robert S. Scott Comments

Robert Scott of Scott Laboratories, San Rafael, CA
Comments on Synopsis of Lee-Fleet Papers

The published papers of Drs. Lee and Fleet can be important to the wine industry worldwide, but several comments appear in order from a pragmatic standpoint.

1) Cork stoppers can be carriers of microbiological infection. Vintners should not be panicked by this finding nor does this fact make corks unsuitable as wine closures.
   a) Proper sterilization techniques are available and when consistently laboratory checked, can furnish commercially reliable and wine-sterile closures.
   b) Other closures can also become contaminated.

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c) Natural cork has been an effective closure material for hundreds of years.

d) A cork, in addition to providing a good barrier, is part of the mystique which makes wine enjoyable. It may be the same wine in a paper cup, but it tastes better from a Baccarat glass!

2) Based on our laboratory analysis of samples from hundreds of millions of corks we agree with the reports that molds are ubiquitous. Soil bacteria can be found to something less than half the levels of molds. Most important yeasts, not only S. cerevisiae and S. bayanus but also spoilage yeasts and wine spoilage bacteria are present from time to time on corks.

3) Lee says, "Growth of these organisms within the cork prior to insertion in the bottle may result in the generation of metabolites that may leach into the wine causing 'off flavors'." A rapid analysis of the cork manufacturing process may help to separate areas of real and imagined danger.

Corkwood is the bark of the cork oak harvested every nine or more years. After harvest, it is held in or near the forests for days or months. The bark is transported to the point of manufacture where it is held for one month to three years. It is then boiled and baled in which form it is held for another month or more. If the period has been long, a second boiling is performed before the bark is cut into strips and punched into stoppers.

After punching, corks are bleached in a chlorine bath, neutralized, rinsed, dried, and finally subjected to a minimum of two and often as many as five mechanical and manual sortings. Corks are then baled and shipped to the country of use.

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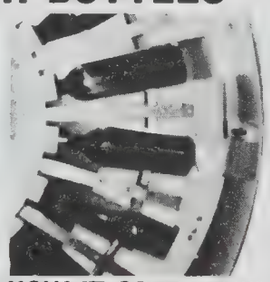

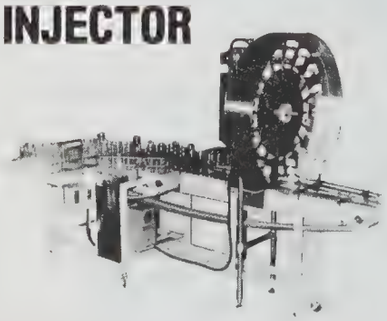

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Bottles are air rinsed for 2-45° long segments while inverted. From 10:00 to 2:00.

Inert gas is then injected while bottles are still held up in rinse tubes from 2:30 to 4:30.

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Line Speed	Air Cleaning	Gas Injection
60 bpm	5 sec.	3.3 sec.
90 bpm	3.3 sec.	2.2 sec.

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- Line space of only 25" to 40" depending upon line speed.
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Molds can infect the cork on the living tree and molds are a constant threat all through the process, despite the boiling, because of the moist conditions. Generally speaking, if corks do not smell moldy-showing post punching growth, there is no danger of imparting a moldy flavor to wine; but because of the constant danger of prior mold growth and the potential of leaching metabolites, we are concerned.

We do not know a solution to this potential danger beyond knowing the producer's reputation for sanitation and insisting that our representative in the cork producing region watch the wood, watch the sanitation of the plants and remain constantly vigilant.

It is our view that 2, 4, 6-trichloroanisole has been more of a bad actor in causing musty cork off-flavor. This is the very occasional result of improper chlorine treatment during manufacture. Vigilance is most effective at point of production. We are vigilant both here and there to protect against such off-flavor.

Yeasts and bacteria are another matter. None could survive the boilings or the chlorine. Yet they exist on cork received from Europe. We have found yeasts in the water droplets gathered on top of our ocean container after a winter trip.

Portugal and Spain are wine drinking countries. Even when the cork plants are outside the commercial wine areas every farmer grows some grapes. The microflora are everywhere and can infect corks at any time after bleaching. This does not permit metabolites but unless corks are sterilized, can spoil wine.

4) Lee continues, "Some attention has been given to molds but practically none to the presence of yeasts and bacteria in wine corks." I do not agree. It was the awareness of the danger of such microflora which led us to install the first sterilization process and laboratory controls in 1977.

I do not know the motivation behind the installation of other lines in America now, but most of the German cork producers sterilize corks and advise it is because of the wine viable organisms. I know of sterilization plants in Australia, New Zealand, and South Africa, in addition to our Canadian facility.

5) The Synopsis concludes, "SO_2 was not effective against bacteria." We do not know the exact method Dr. Lee used, but we do know that with the process we use, almost no, and after quality control, absolutely no wine viable microflora remain. Molds are reduced in degree similar to Lee's report which is important only for the top of the cork in case of spillage or leakage, since mold will not grow in wine. An occasional bacillus has been found but is not wine viable. No yeasts survive.

In summary:

A. Natural cork is an excellent closure. It can be made wine sterile.

B. Procuring wine sterile corks is worth the effort. The user or his supplier should constantly validate the effectiveness of the process.

C. Once opened, sterile bags should be completely used or resealed to prevent random reinfection.

D. Corkers should be kept dust free and jaws regularly swabbed with high proof ethanol or sprayed with iodofor or chlorine solution.

E. Corks can be contaminated but so can air, people, equipment and particularly wine. Eternal vigilance is worth it!

TWELVE WINEMAKERS EXPLAIN THEIR STYLE MERLOT

By NANCY LYNN GRAY

Merlot at one time was considered merely a blending grape used to soften the tannic edge of Cabernet Sauvignon. As a varietal wine in the early 1970's, Merlot slid into the category of being soft, non-descript, an acceptable but hardly conversational wine.

In the past five years, Merlot started receiving more attention and respect. Several winemakers, having given serious study and experimentation to the potential of this variety, have produced wines of substance and distinction.

Winemakers interviewed were Bernard Portet, Clos du Val; Tom Rinaldi, Duckhorn Vineyards; Dick Erath, Knudsen Erath; Alison Green, Firestone Vineyards; Lance Cutler, Gundlach-Bundschu; Alex Hargrave, Hargrave Vineyard; Joe Cafaro, Keenan Winery; Michael Martini, Louis M. Martini; Phil Baxter, Rutherford Hill; Kay Simons, Chateau Ste. Michelle; Bill Dyer, Sterling Vineyards; and Bob Robertson, St. Francis Vineyards.

How do you describe the style of your Merlot?

Portet of **Clos du Val** makes Merlot in an elegant, claret style, balanced, highly complementary to food. Rinaldi of **Duckhorn Vineyards** describes their Merlot as a balanced, straight-forward, drinkable wine, appreciable when young, but structured enough to age well.

Firestone Vineyards has been making two Merlots from two different vineyards. The Ambassador Vineyard Merlot was characteristically what Green terms 'an intense, cassis-like' Merlot due to the gravely soil and stressed growing conditions.

"Arroyo Perdido Merlot was a smoother, earlier drinking wine with berry characteristics," says Green. In 1980, the vineyards were blended together. Green intends to make only one Merlot.

"It's a tough variety to work with in our area because it is so intense, vines are on their own rootstock," says Green. "We've tried to tone it down. In this area, it is a very distinct variety on its own." Green believes Merlot as a wine should be approachable for any occasion and at a price that will make it possible to be drunk every night with a variety of foods.

Cutler of **Gundlach-Bundschu** describes their Merlot as a big, fairly lush, highly tannic wine, meant to be aged.

Style is a dramatization of natural balance achieved in the **Hargrave Vineyard**. Character of the wine comes from ripened fruit. "A great actor can't do much with a weak part," says Hargrave, "Time on skins, time in oak, speeding up the clock with fining agents; none of these can substitute for character of the grapes.

"I am, of course, enamoured by the softness Merlot promises, the silkiness. Its texture is so apparent and accessible. We seek balance and because the elements change every year, so does our impression of how we should approach it," added Hargrave.

Cafaro of **Keenan Winery** is making Merlot for long term ageing and to complement food. "Because we do look for long term ageing, we do have relatively high tannins and good acidities," says Cafaro, "but not too high as to overpower a meal."

The style of **Knudsen Erath** Merlot is described by Erath as that of a St. Emillion, with the soft fruitiness of Merlot, as opposed to the hard, dusty style characteristic of the Bordeaux of St. Estephe.

When making Merlot, Martini has to take the entire varietal line of **Louis M. Martini** wines into consideration. "Merlot is a soft, luncheon style wine," says Martini, "we let the Cabernet Sauvignon be the more powerful of our red wines."

At the same time, he has been experimenting with ways to restructure Merlot through various procedures, using skin contact, stem return, oak ageing and blending. Martini wants to intensify the Merlot character, "to make a bolder, richer wine but not necessarily a bigger wine," says Martini.

Baxter of **Rutherford Hill** produces Merlot, "to make a wine of elegance, something very soft but with enough complexity to make the wine interesting," says Baxter.

Chateau Ste. Michelle makes a medium to light bodied style of Merlot, fruity, with the benefits of oak ageing.

"We make Merlot to be a wine that is balanced, one that is integrated, that has harmony and is not overblown in any one direction," says Dyer of **Sterling Vineyards**.

St. Francis Winery is seeking a style of Merlot which is more elegant than most California Merlots. According to Robertson, most Merlots in California tend to be harvested too late. "This gives them a raisiny, pruney quality with hot flavors. With the right vineyard practices, this can be avoided," believes Robertson.

What are characteristics of the vineyards?

Merlot at **Clos du Val** is harvested from two Napa Valley vineyards. Clos du Val's own vineyard, on the Silverado Trail, is mostly rich, well-drained loam soil. The other vineyard is just south of Yountville. Soil and climatic conditions are similar to the Silverado vineyard, yet the grapes have a fruitier character with less herbaceousness than often associated with Merlot.

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Duckhorn Vineyards harvests Merlot from several Napa Valley areas. Three Palms Vineyard is near Calistoga, an area relatively warmer than other parts of Napa Valley. Soil is extremely rocky and well-drained. Under these stressed conditions, grapes ripen early and are often picked around Labor Day.

A second vineyard in the Stag's Leap/Silverado area spans a hillside from knoll to valley. Soils are rock and gritty sand. Vines on top are quite stressed, the fruit being susceptible to sunburn or drying out early, while vines near the bottom grow like weeds.

"What we do, is go through a vineyard and specifically pick out an area, row by row, looking for the best drainage and avoiding any diseased areas," says Rinaldi. Duckhorn has been harvesting Merlot from vineyards in other areas to determine the maximum potential of Napa Valley Merlot.

Firestone harvests Merlot from Arroyo Perdido Vineyard, located three miles from the winery, and from Ambassador vineyard adjacent to the winery. Arroyo Perdido has rich black soil. Ambassador Vineyard has gravelly soil, causing a good deal of stress in those vines.

Arroyo Perdido Vineyard holds its water well and there is no need to irrigate. Ambassador Vineyard will get one watering in June, just enough to fill in the 13-14 inches of natural rainfall to 20 inches. Climate, while categorized as moderate Region II, does experience long cool springs and falls. Frosts can be severe but usually not past April. Tonnage varies widely from year to year.

"We will get anywhere from one-five tons/acre, depending on the frosts," reports Green.

Gundlach-Bundschu harvests Merlot from two estate vineyards in the Sonoma Valley. Close to the Carneros region in Napa County (Region I - Region II), one vineyard is located on hillsides and one is on flat land. The hillside soil is rocky and shallow, three feet deep at best, while the flatland soil is heavier river bottom soil.

Fruit from the hillside vineyard tends to be tough and tannic while the flatland fruit has more of a grapey quality. Gundlach-Bundschu has switched from cane to cordon pruning. Pruned to fourteen buds per arm,or 26-28 buds, Cutler claims this has greatly improved the condition of the fruit, providing a more even spread and spacing of clusters along the vine.

Hargrave planted Merlot in the heaviest soil of their Long Island vineyard. The four foot deep soil is dark with iron. "A lovely medieval conception I cherish is that this will translate itself into strength in the wine," says Hargrave.

For the past four years, **Keenan** has been purchasing grapes from the Carneros region of Napa Valley. The Carneros vineyard is in a warm sheltered area, which receives very little wind, on a small sloping hillside. "I do think Merlot needs fairly warm conditions, without too rich a soil, or a lot of wind because of its tendency towards shatter," notes Cafaro.

In 1982, Keenan included some Merlot from south of Yountville. This vineyard, on flat land, has a warmer climate than Carneros though both classify as Region II.

In 1979 and 1981, **Knudsen Erath** used grapes grown at Sagemoor Farms near Pasco, Washington and grapes grown in three vineyards in Dundee, Oregon, near the winery. Erath explains that Oregon grapes are lighter in body, cherry-like, and have more finesse, while Washington grapes have more body and a vegetative-herbaceous character.

Vines of the non heat-treated clone were planted in the three Dundee vineyards in 1973 and 1974. Excessive nitrogen in the soil will affect the set, often causing shatter. Erath plants cover crops in order to knock down the nitrogen.

Martini believes Merlot is best grown in cool areas. Since 1968, the winery has harvested Merlot from the Russian River Valley appellation. Presently, Merlot is harvested from five different vineyards, two in Sonoma County and three in Napa Valley.

Los Vinedos del Rio Vineyard, west of Healdsburg, was their first Merlot vineyard. It was planted in 1964 from budwood of 20-year-old vines. The vineyard is in a fog belt area, classified as Region I, similar to the climate of Carneros in Napa. Soils are of fairly rich riverbed type.

The vineyard which now accounts for 50-60% of their Merlot production is located in the Alexander Valley. A bit warmer, this area is classified Region II. Soils are heavy, deep and rich and there is some problem with shatter.

Martini has been fighting shatter by planting on leaner soils and by experimenting with reduced fertilization and irrigation.

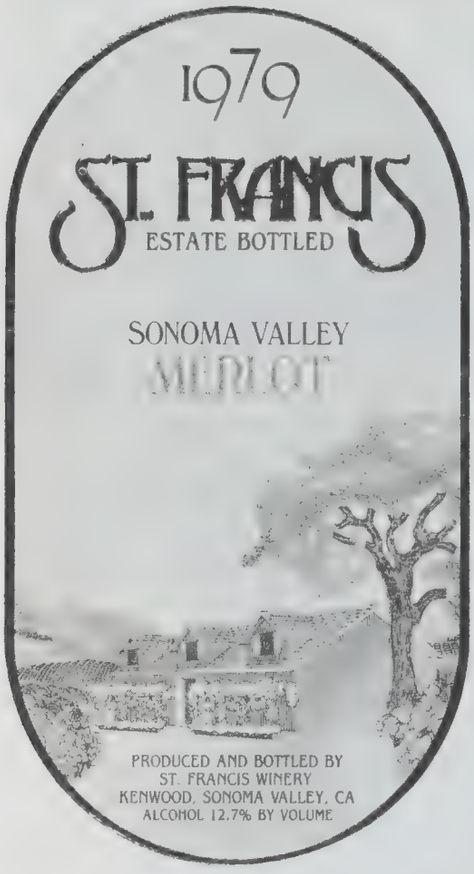
The three Napa Valley vineyards center around St. Helena. Soil types vary, ranging between clay, riverbed, gravel and loam. "We get a more Cabernet-like character from the Merlot grown in Napa than from the Alexander Valley," observes Martini.

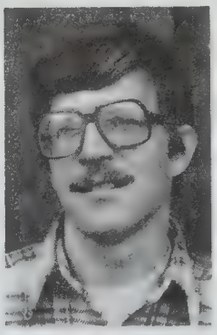
Rutherford Hill harvests Merlot from two vineyards in Napa Valley, one just north of Napa which supplies 90% of their Merlot and a small vineyard between Rutherford and Oakville. Soils of both vineyards are heavy, almost clay-like, due to the proximity of the river. Both vineyards qualify as Region II on the U.C. Davis scale.

"Merlot, in the cooler area of the valley, has given more complexity, more flavor, more color to the wine without the hotness which sometimes comes from the upper valley Merlot," explains Baxter. "Cooler areas allow grapes to develop more flavor and color before developing too high a sugar level."

In the past few years, Rutherford Hill has been balancing the vine by pruning for a good amount of wood growth as opposed to just pruning and letting the vine 'go to town'. Quality of the grapes, according to Baxter, has improved every year as a result, yielding grapes of greater flavor, color and complexity, needing less Cabernet Sauvignon in the final blend.

Lance Cutler





Bob Robertson

Chateau Ste. Michelle has used Merlot grapes from a variety of vineyards and will continue to vary their selection until their own vineyards come into production. Generally, they are concentrating on warmer areas. Vineyards in central Washington are planted on their own rootstock, except for some small experimental blocks.

"The growing season is warm during the middle part of the season and cool during the ripening portion," reports Kay Simons. "This results in slightly higher titratable acidity than, for example, many California regions."

Vineyards planted on south-facing slopes have good air drainage and exposure, along with a greater day-length during the summer months. "This increased photosynthesis helps make up for our shorter season," adds Simons.

Sterling harvests Merlot from several vineyards in Napa Valley. The mountain top vineyard of the Peterson Ranch has deep red soils which holds moisture well.

Diamond Mountain Ranch vineyard is a new hillside planting which has just come into bearing. Soils vary from red to gravel to loose volcanic soil. Due to excellent drainage, the vineyard can dry out quickly in the summer, so drip irrigation is used.

Three Palms Vineyard has soils so rocky that it is impossible to cultivate. Dyer terms this soil type as 'pre-historic riverbed'. Sterling's primary source of Merlot is the Bear Flats/Bothe vineyard. Fruit from this vineyard is more restrained, providing a balance to the intensity of hillside vineyards.

The **St. Francis** vineyard in the Sonoma Valley was planted in 1971. Soils are deep loam, gravelly and well drained. Soils contain very little nitrogen and there has been no problem with shatter. Robertson believes shatter can be prevented through pruning, the amount of water the vine receives and the amount and type of nutrients in the soil.

How is the time of harvest determined?

Portet determines the right time to pick **Clos du Val** Merlot by 'the look of the vine', the way leaves change hue, grow dull and by the way fruit hangs from the vine. While acids and pHs are of importance at harvest, sugar levels are given more consideration. Grapes are usually picked between 23.5°-24.0° Brix, depending on the year.

pH is a critical factor when picking **Duckhorn** Merlot. "If when we check, pH is 3.2-3.3 and sugar is only 21.0° Brix, we don't wait until the sugar gets to 22.0°, we go ahead and pick," says Rinaldi. It is important at Duckhorn, that when fruit is picked, they are in the vineyard with the pickers, making sure they get the fruit they want, the way they want it. Grapes are all hand-picked, preferably into one-ton bins, usually in the morning.

At **Firestone**, Green will wait for the flavor, aiming for sugars of 23-23.5° Brix. "If you bring them in too early," says Green, "they will taste like sagebrushes. pH is watched closely because they tend to go up fast once they reach 3.4.

"Arroyo Perdido Vineyard can get up to 26° Brix and acids will still be 0.9-1.0 with a pH of 3.4. But Ambassador Vineyard will shoot up from 3.5 pH to 3.7 in less than four days. Because of this, we may pick that vineyard a little bit earlier. By mechanically harvesting Merlot, we can bring in the entire vineyard in one day if the pH starts to go up," adds Green.

Once grapes reach 21.5° Brix at **Gundlach-Bundschu**, they will start a chart and check pH daily. Usually, vines shut down at 21.5° Brix and stay there for one-two weeks. "If during this time," says Cutler, "pH starts to go up, we will pick, but this has never happened. What does happen is the sun will come out, Brix will jump two points in a day and a half, and then we pick as fast as we can.

"Every other year, since 1976, we bring in Merlot just where we want it, at around 23.5° Brix, then the next year it will jump up so high that the wine is much higher in alcohol. They are two different wines and I happen to like both styles."

In 1979, Merlot came in around 23.5° Brix and the alcohol was 13.0%. In 1980, grapes came in closer to 25° Brix and the wine was 14.4% alcohol.

At harvest, **Hargrave** is watching pH. Seeking to retain maximum color in the wine, he aims for 3.4 pH with TA and Brix falling 'right into line' by early October.

"Ideally," says **Keenan's** Cafaro, "I would like to harvest Merlot between 22.5-23.0° Brix, 0.85 acid, with 3.3 pH." They come in pretty close, averaging 22.7°Brix, 0.8 acid and 3.35 pH."

Vineyards around **Knudsen Erath** at 400 foot elevation, are typically harvested about October 20, when every berry in the cluster is fully colored. Small crop years will reach sugars as high as 23° Brix, large crops will reach about 20°. Sagemoor Farm grapes are usually picked between the last week of September and third week of October when fruit reaches 23° Brix, to balance Oregon grapes.

Martini harvests Merlot 'when it's ripe', which varies with each vineyard. Los Vinedos del Rio in Alexander Valley usually comes in at 22.5°-23° Brix, Napa vineyards at 23°-24° Brix. "What I look for is a sugar-acid-pH balance," says Martini. Average ratio of all the vineyards is usually 22.5°-23° Brix, 0.75 acid and 3.2-3.3 pH.

Towards the end of September, **Rutherford Hill** charts progress of the vines, being careful not to let acids drop or sugars go too high. Baxter likes Merlot at no higher than 23° Brix, at 0.8 acid and 3.3 pH. "Both Merlot and Cabernet Sauvignon should not be 14.0% alcohol wines and they should not be picked at 24° sugar," notes Baxter.

During harvest at **Ste. Michelle**, viticulturists and winemakers have weekly meetings to determine when certain varieties will be harvested. Taken into consideration are analysis of Brix, acid, pH, physiological condition of the fruit and vineyard, other scheduling factors, such as other varieties which may be ripening at the same time and weather conditions, such as likelihood of impending freezing temperatures.

Sterling gives top priority and consideration to Merlot for their Reserve Cabernet Sauvignon. Merlot is used as a pivotal wine to complement Cabernet and is harvested accordingly.

"In a year where it looks like Cabernet may be on the ripe side," says Dyer, "Merlot will be picked earlier to compensate. In a very cool year, where it looks like it may be questionable that all Cabernet Sauvignon will ripen, we might let Merlot get quite ripe. This is simply a practical use of Merlot for blending as found in Bordeaux."

The finest Merlot from select vineyards, picked at optimum maturity, is used in Reserve Cabernet Sauvignon, with the finest remaining lots being used for varietal Merlot.

"During harvest, we sit down each morning and look at the numbers of the lots already in the winery, data and numbers coming in from the vineyard, where the blend is at that point in degrees alcohol, and what the weather predictions are. All these factors will determine when we pick Merlot," explains Dyer.

Balance of the lots used for their Merlot averages around 22.5°-23.5° Brix, 0.75 acid, and 3.4-3.5 pH." One thing I have noticed about Merlot as compared to Cabernet is that over a spectrum of maturity levels, whether you pick early or later, it can make a nice wine," adds Dyer.

Robertson at **St. Francis**, who determines time of harvest by taste, sugar, and schedule says, "Merlot does not develop a 'magical quality' or taste when it is ready to be picked such as Gewurztraminer will. There is, however, an earthy, dusty quality in the grapes' taste." Grapes are ideally harvested at 22.5°-23° Brix with the acids, 'as high as you can get them, over 1.0 if possible.'

Since 1980, St. Francis has used a mechanical harvester. "The mechanical harvester gives us the control we want at harvest," adds Robertson. "In 1979, we hand-picked and the sugars ranged all over the map, from 22-25° Brix. To me, this is not acceptable picking. With a mechanical harvester, we can bring in the fruit quickly, right at 23°."

How is the fruit crushed and fermentation conducted?

Clos du Val adds approximately 50 ppm SO_2 at the crusher.

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Tartaric acid may be added prior to fermentation depending on sugar level of the juice, how it tastes and color of the must. If the wine has a purple hue it may need acid, if it has a red hue, no acid addition will be made. Acid additions are rare at Clos du Val.

Champagne yeast is used in fermentation and wine is inoculated for malo-lactic with ML34 during primary fermentation. Malolactic fermentation is usually finished by December. Once dry, the wine is pressed off skins and allowed to settle before being racked into barrels. Vineyard lots, press and free run are kept separate until blending before bottling.

At the **Duckhorn** crusher, "We have a couple of people to pick out leaves and moldy or raisined grapes, so they are really hand-selected," says Rinaldi. '82 grapes were crushed without SO_2.

Acid addition will sometimes be made before fermentation to bring the acidity to 0.75-.78. Must is inoculated with fermivin freeze-dried yeast and will normally ferment on skins until dry, usually seven-eight days. Fermentation temperatures usually are around 80°F .

Rinaldi inoculates for malo-lactic with ML34 once the wine has reached 18°-17° Balling. "Malo-lactic fermentation will usually finish after winter starts and before spring is over," says Rinaldi, "but malo-lactic is not necessary for a good Merlot, but it is preferable for stability."

Firestone grapes are crushed with approximately 30 ppm SO_2. Must has been inoculated with Pasteur Rouge yeast in the past, but because it was not a very vigorous culture, Green switched to Epernay this year.

Wine ferments at 55-58°F peaking at 65°F during the last two days. "We try to keep the cap warm, in the upper 80's to mid-90's," says Green, "and keep the juice cool." During fermentation the wine will be pumped over twice daily for ten minutes.

If necessary, Green will make an acid addition during fermentation with tartaric acid in consideration of pH. "I've found that if acid is added while the wine is fermenting, only a small amount of acid, maybe five pounds/25 tons, can change the pH considerably." Wine ferments on skins for approximately 10 days.

Because each lot may have come in at a different time, at a different degree Brix and because the rate of fermentation varys with each lot, some lots may be pressed off at 7° Balling while others may have been dry for two days. These differences in skin contact and phenol extraction give Green several parameters to work with when blending.

Wine is inoculated with PSU1 for malo-lactic fermentation and is held in oak uprights for two-four months. Once malo-lactic has finished, wine is racked into Sirugue and Nadalie barrels. SO_2 is adjusted to 65-70 ppm total.

As of 1982, no sulphur is added to **Gundlach-Bundschu** Merlot until after malo-lactic is complete. Cutler preserves fruit by fermenting Merlot at cool 70-75°F temperatures, extracting all necessary phenols and tannins by leaving wine in contact with skins for 10-18 days. This gives the wine necessary tannins for longterm ageing as well as fruit to stand up to tannins. After malo-lactic completion, wine is racked and approximately 20 ppm SO_2 will be added, depending on pH.

No SO_2 is used by **Hargrave** until after fermentation. Must is inoculated with Red Bordeaux yeast and fermentation temperatures may peak at 80°F. Once the cap starts to fall, wine is pressed off and left on lees until malo-lactic is complete. Wine picks up malo-lactic bacteria in the winery.

Cafaro will not add SO_2 at the **Keenan** crusher but will add 40 ppm or less into the tank. Must is inoculated the next morning with Montrachet yeast and 44-40 malo-lactic bacteria. Wine is pressed off skins at 4-5° Balling. Press and free run are blended together.

Cafaro's recent practice is to pump over less and press off sooner. "A few years ago, because we are aiming for long term ageing, I put more emphasis on tannin, while now I am more concerned with balance, finesse," says Cafaro. "Wines are still relatively high in tannin but within a year they are drinkable.

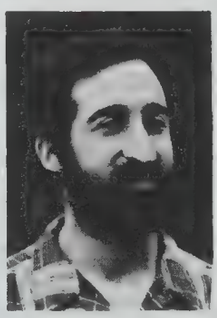
"After five-eight years, they are still balanced and the fruit is there. Neither wood nor tannin at that point is overpowering." 50% of malo-lactic fermentation is finished two weeks after pressing. At this time, wine is put into barrels. Remaining malo-lactic fermentation finishes in the spring.

Knudsen Erath, adds 0-30 ppm SO_2 at the crusher, depending on the fruit's condition. Erath likes fermentation temperatures to peak in the low 80's during an average seven day fermentation. Erath uses Pasteur Red yeast which he has found takes higher alcohol levels more easily than Assmanhausen which he used in 1979.

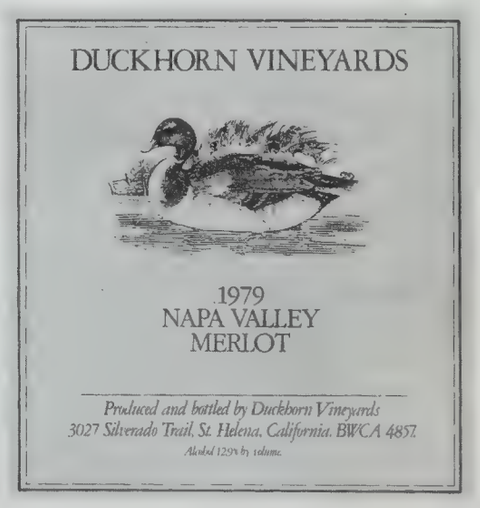
Erath presses the skins at about 1° Brix to prevent the wine from picking up too much astringency by going dry on the skins. Wine is inoculated for malo-lactic at the peak of primary fermentation with a culture isolated at the winery

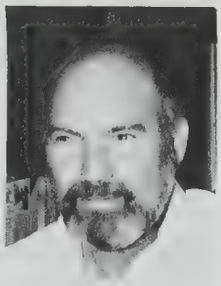
Keenan
MERLOT
1979 Napa Valley
PRODUCED AND BOTTLED BY ROBERT KEENAN WINERY
SPRING MTN., ST. HELENA, CA Alcohol 13.7% by Volume

Joe Cafaro



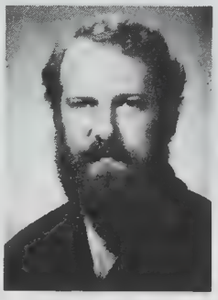
Tom Rinaldi





Dick Erath

Michael Martini



several years ago. Malo-lactic finishes during settling after pressing.

Martini adds 80 ppm SO_2 at the crusher, resulting in 60 ppm at the tank. After running a test on pH, an acid addition will be made with tartaric to lower the pH to 3.2-3.3.

Must is inoculated with Champagne yeast. Wine ferments in large 14,000-15,000 gallon tanks at approximately 70°F. Experiments have been done with a temperature curve, keeping wine at 65°-70°F through its most active fermentation stages, and then letting it go, allowing temperature to rise to almost 90°F. Fermentation usually lasts six-seven days. Martini feels this fermentation makes the wine intensely fruity, emphasizing varietal character.

In past years, Merlot has fermented five-six days on skins before being pressed off at 2°-3° Brix. In 1981, Martini fermented some lots on skins seven-eight days, some lots for up to two weeks on skins with 10-15% stem return. Pleased with the results, in 1982, Martini fermented all the wine for two weeks on skins with 10-15% stem return.

When dry, wine is pressed off and only free run is used. It remains in large tanks until malo-lactic fermentation from bacteria picked up in the winery is complete, which is usually by December.

After mechanical harvesting, **Rutherford Hill** grapes are crushed with approximately 75 ppm SO_2. Must is inoculated with Champagne yeast and fermented on skins in either stainless steel tanks or in roto-tanks at temperatures between 70-85°F.

"Roto-tanks give us a process similar to punching down which is what we're after," explains Baxter. "It gives a winemaker much more control over flavor and tannin extraction, much more so than pumping over."

An acid addition will be made after fermentation only if Baxter feels it will balance the wine or bring it closer to his idea of what the wine could be. "The idea is to do as little as possible to the wine yet do everything we have to do in order to make a better wine," adds Baxter.

Chateau Ste. Michelle red wines are made at a small Yakima Valley winery. Grapes are crushed into open fermenters with about 30-40 ppm SO_2. The next morning, must is inoculated with a liquid Red Pasteur starter. This starter contains a Leuconostoc malo-lactic bacteria as well.

Grapes remain in the primary fermenter for seven-ten days. Temperatures are allowed to go to 80-85°F before being cooled to 70°F, drained and pressed to redwood tanks in a room which is maintained at about 70°.

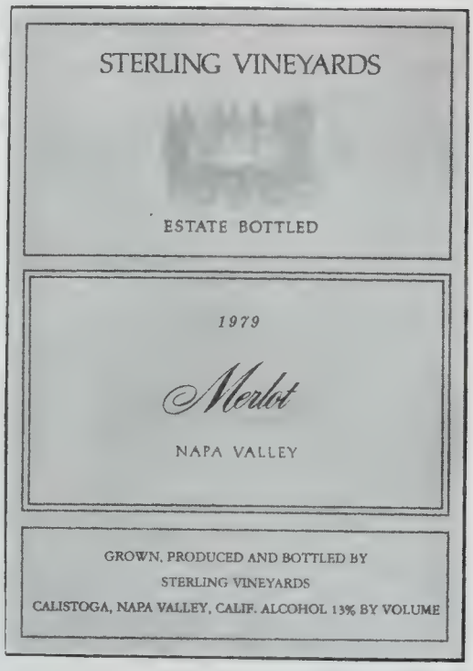
At **Sterling**, before fermentation, both acid and pH will be checked to determine whether an acid addition is necessary. "Some vineyards will need an acid addition, some will not," says Dyer. "We use our judgement based on past experience with these vineyards as to whether the acid tends to drop out. pH is our main indicator." Tartaric acid will be added to bring the pH down to at least 3.5.

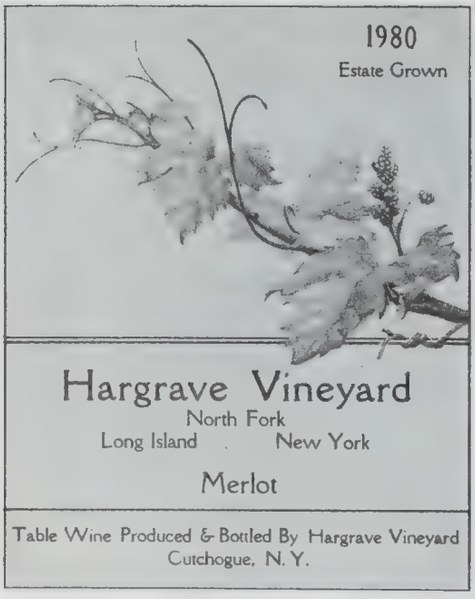
Must is inoculated with Montrachet yeast. Only in the past two years has Sterling inoculated for malo-lactic with ML34 in order to insure a finished malo-lactic fermentation by Christmas, before beginning blending trials in early January. Once dry, the wine is pressed, settled, racked into 3,000 gallon oak uprights and inoculated for malo-lactic.

Blends will be made before barrel ageing. Sterling usually blends anywhere from 10-20% Cabernet Sauvignon into the finished wine but in some years as much as 32% has been included.

Very little to no SO_2 is added at the **St. Francis** crusher. Robertson has switched from Montrachet to Champagne yeast due to sulfite problems with Montrachet. In '81 and '82,

Bill Dyer





Alex Hargrave

Robertson induced malo-lactic with 44-40 during primary fermentation in order to complete malo-lactic as soon as possible.

While no acid addition is necessary prior to fermentation, Robertson will add tartaric after malo-lactic in order to adjust the pH for taste and biological stability.

What are the barrel ageing and blending procedures?

Clos du Val wine spends one year in oak tanks and one year in French Nevers oak barrels. New barrels are purchased yearly and wine is rotated between new and old barrels. The final blend is made during barrel ageing. Portet will blend some Cabernet Sauvignon only if it will help the wine and even then, usually never more than 7%.

Rinaldi trys to put **Duckhorn** wine into new or relatively new French Nevers oak barrels as soon as possible. As the wine is racked into barrel, Rinaldi may adjust the SO_2 to 15-20 parts free. Wine is barrel aged for 18 months. Rinaldi has experimented with Nadalie's American oak and likes the results when used in small amounts.

While in barrels, wine is racked every three months or so. Blending is done in the course of racking. The percentage of Cabernet Sauvignon in the blend depends on the vineyard. If Duckhorn is making a 'Three Palms Vineyard' Merlot, the blend may contain up to 23% of 'Three Palms' Cabernet. In 1979, other vineyards were included along with 30% Cabernet.

In 1980, the blend consisted of five vineyards, Cabernet Franc (16%) and Cabernet Sauvignon (8%). In 1981, Duckhorn made two Merlots, a 'Three Palms' and a Napa Valley Merlot. For the past three years, Cabernet Franc as well as Cabernet Sauvignon has been used in all blends except the 'Three Palms' designated wine.

Firestone wine usually stays in French oak barrels for one year. "Merlot picks up a lemon character, almost a lemon peel," says Green. "Between the berry, lemon and vanilla, it becomes a very pretty wine". Green begins blending while racking during barrel ageing.

"We add anywhere from four-eight percent Cabernet Sauvignon. Arroyo Perdido has taken less Cabernet and Ambassador up to eight percent," says Green. Before deciding on any blend, Green will do a tasting of different Cabernet-Merlot blends of varying percentages.

At the tastings, she will decide not only how much Cabernet will go into the Merlot but also how much Merlot will go into the Cabernet. "Every year we have added Cabernet to the Merlot but have not added Merlot to the Cabernet," says Green.

Gundlach-Bundschu ages Merlot in a combination of French and American oak barrels for approximately ten months.

One-year-old barrels are used to age Merlot at **Hargrave Vineyard**. Both American oak and French oak barrels are used. The wine is aged for approximately 12 - 15 months. Hargrave uses oak for maturation reasons, not for flavor. Eighteen months of barrel age would be maximum.

Keenan Merlot ages in French Nevers oak barrels for 15-18 months. Of each new vintage, 20% is aged in new oak.

Knudsen Erath wine is DE filtered prior to being put into Nevers and Allier barrels, previously used to age Pinot Noir. Barrel ageing typically lasts about nine months.

Prior to 1981 at **Martini**, only large redwood and American oak tanks were used for ageing. "Redwood maintains a strong backbone of fruitiness," says Martini, "I use oak only as a seasoning, in the background, only to add nuance."

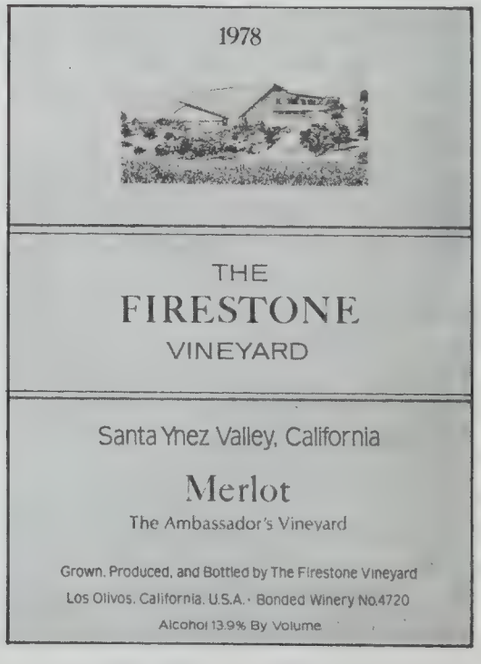
Currently Martini ages only a fraction of the blend in oak barrels for six-twelve months, after which they will continue to age in larger redwood or oak tanks. Experiments continue with both French and American oak barrels on a certain percentage of the Merlot.

Martini experimented by putting 15-20% of the Merlot into two-year old French oak barrels, 75% into older American oak barrels. This same experimental lot had received 14 days of skin contact, 10-15% stem return. In 1980, Martini put approximately 9% of the Merlot in French oak.

Whether in barrel or in larger wood tanks, Merlot is kept in wood for two-two and one/half years. Approximately one and a half years into its ageing, Martini will make the master blend, balancing different vineyards, amount of oak and usually including seven-eight percent Cabernet Sauvignon. Wine is held in redwood tanks until all components of the wine have a chance to marry.

Rutherford Hill wine is barrel aged in both new and old

Alison Green



French Nevers oak barrels 15-18 months.

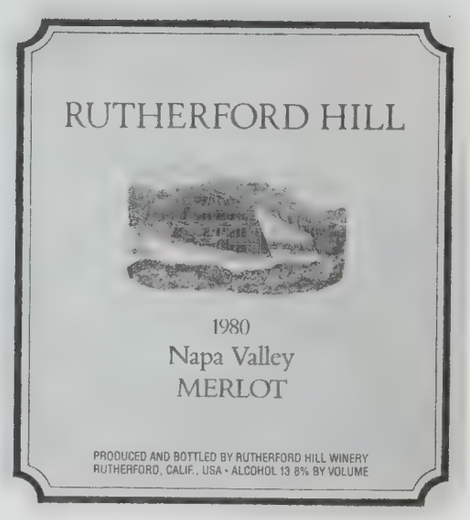
After several rackings and a light gelatin fining, **Ste. Michelle** Merlot is rough-filtered, blended and racked into barrels. Merlot is primarily aged in American oak, although French oak was tried in 1981. Because many barrels are relatively new, wine will stay in oak for a year or less.

"When we feel the blend has matured enough and has been in oak long enough, it is racked from barrels and reblended," says Simons.

Before the **Sterling** blend goes into barrels, it is clarified with gelatin, approximately one-quarter pound/1,000 gal. The wine is aged in both new and used French Nevers oak barrels one year.

Robertson prefers to put **St. Francis** Merlot into barrel as soon as possible. The 1982 vintage was lightly DE filtered before being put into barrels. Robertson feels the advantage to this is twofold: one, it will inhibit any development of harmful bacteria and two, it will prevent re-introduction of lees when topping the barrels. Merlot ages in Nevers oak barrels and a few Limousin oak barrels for about a year.

Phil Baxter



How is the wine finished?

Clos du Val's final blend is fined with egg whites. Prior to bottling, the wine will receive a pad filtration. Sometimes, in order to help the filtration, the wine will be fined with gelatin. Clos du Val gives Merlot one year bottle age prior to release.

Duckhorn wine in barrels is fined with fresh egg whites. Wine is pad filtered and at bottling, depending upon pH, SO_2 is adjusted to approximately 25 ppm free and under 125 total. Duckhorn releases Merlot after six months of bottle age.

After the **Firestone** master blend is made, the wine is egg white fined. "We always use fresh egg whites. I'll never forget the time we tried frozen egg whites and they smelt like fish. There is no way I am ever going to put anything in my wine that smells like fish," exclaimed Green.

Wine is cold stabilized at 40 °F and DE pad filtered on the way to bottling preceeded by a 0.45 millipore. "DE seems to protect the filtration. With that treatment, the wine seems to cruise right on through," adds Green.

20 ppm SO_2 is added at bottling to keep it at 35 parts free. "We have found that by keeping the SO_2 at 35 ppm the wine is less inclined towards bottle sickness. It may go through a reduced nose stage," says Green, "but not through a stinky phase."

"**Gundlach-Bundschu** fermentation procedures are set up to promote phenol and tannin buildup," says Cutler, "because we want wines that are long lived. Cool fermentation temperatures maintain fruit. In general, no fining is done because it would make no sense to try and remove the very thing we have tried to buildup."

By 'we', Cutler refers to four people who are instrumental in winemaking at Gundlach-Bundschu. Winemaking is a group effort. "When the entire crew is dedicated to and involved in all aspects of making the wine, it has a great deal to do with wine quality. This is one of those intangibles that actually affect the quality of our Merlot."

As wine comes out of barrel, these four people taste and decide on the final blend. Usually Cabernet Sauvignon is included up to 10%. "Merlot by itself is a nice lush grapey style wine, sometimes herbaceous; small amounts of Cabernet can drastically improve the complexity," adds Cutler.

Hargrave cold stabilizes by throwing open winery doors in winter. Merlot receives one polish filtration just before bottling.

Keenan Merlot is fined with fresh egg whites at the second racking. The blend usually includes 5-6% Cabernet Sauvignon.

Knudsen Erath egg white fines after barrel ageing and blending, or gelatin is used to reduce a higher tannin level. Wine receives a tight DE filtration prior to bottling with about 30 ppm free SO_2.

Fining at **Louis M. Martini** is done with egg whites after wood ageing, approximately one-two months before bottling. Wine is cold stabilized at 26 °F for 2-3 weeks and given a DE filtration. Before bottling, the wine is filtered with 0.85 micron pads. SO_2 is added to leave 30 ppm free. Martini gives the wine three-four months of bottle age.

If necessary, **Rutherford Hill** wine is fined with egg whites after blending. In some years, such as 1978 and 1980, the wines were not fined at all. Wine is filtered twice before bottling. Rough filtration is followed by EK polish filtration.

Ste. Michelle Merlot is egg white fined just before bottling. Merlot is given two years of bottle age prior to release.

Sterling fines with egg whites just prior to bottling. On the way to bottling, the wine receives a loose pad filtration and the SO_2 is adjusted to 25 parts free, 80 parts total.

Bernard Portet

St. Francis Merlot is fined after six months or more in barrel with either fresh egg whites or gelatin. Egg whites are preferred because, "Merlot does not have the tannins to merit a heavy, harsh fining," says Robertson.

When is the wine best consumed?

Portet feels Merlot can be drunk young, as soon as it is released, and at all stages of its development. The best time, if there is such a thing, would be five years from vintage date.

Rinaldi feels the 1979 Merlot should be drunk soon, the 1978 and 1980 in four-five years. "Wine released in fall is often consumed by Christmas," says Rinaldi. "People too often drink the wine when it is young but I feel those who hold on to it are in for a real treat."

While Firestone in the past has made Merlots that will age 10 years, Green wants to make a wine that is in balance in four years and, that you can drink without apologizing in three years.

Cutler is making a Merlot loaded with tannins that will in 10-15 years still have the fruit of Merlot and complexities of Cabernet to make it an exciting wine. Erath predicts a long optimum maturity for the wine as the '76 has yet to peak. Cafaro feels their Merlot is best drunk 5-8 years after it is released. Martini believes the wine is best consumed 3-5 years after bottling.

Though Merlot is quite drinkable when young, Baxter feels the best time to drink his Merlot is after five years of bottle age. Dyer feels the wine is best consumed between five-ten years of age.

Robertson feels the St. Francis Merlot is best drunk within four-six years, depending on the vintage. "1978 and 1980 will mature sooner than the 1981," says Robertson. "Merlot is a little like Zinfandel, you can drink it at Christmas, after it has been released, or in ten years. In California, we really haven't been making it long enough to know just how long it will age."

What are the reasons for blending or not blending Cabernet Sauvignon in Merlot?

Blending at **Clos du Val**, is determined by tasting blends which successively increase and decrease by half points in their percentage of Cabernet Sauvignon. There is no rule at Clos du Val for use of Cabernet Sauvignon in Merlot. "Sometimes Cabernet Sauvignon helps, sometimes it does not," says Portet.

Rinaldi has used both Cabernet Sauvignon and Cabernet

MERLOT WINEMAKING SUMMARY

WINERY	HARVEST CRITERIA	SO_2 at CRUSH	ACID ADDITION	YEAST	MALOLACTIC FERMENTATION INOCULATION	COOPERAGE LENGTH OF TIME	FINING or FILTRATION
Clos du Val Bernard Portet	23.5-24.0° Brix	50 ppm	before primary fermentation	Champagne	ML 34 during primary fermentation	oak tank one year Nevers barrels one year	egg white fining pad filtration
Duckhorn Vineyards Tom Rinaldi	22.5° Brix 3.2-3.35 pH 0.75-0.78 TA	0	before primary fermentation	Fermivin	ML 34 at 18-17° Balling	Nevers barrels 18 months	egg white fining pad filtration
Knudsen-Erath Dick Erath	23° Brix	0-30 ppm		Pasteur Red	at peak of primary fermentation	Nevers & Allier barrels 9 months	egg white or gelatin fining tight DE filtration
Firestone Vineyards Alison Green	23.0-23.5° Brix	30 ppm	during primary fermentation	Epernay	PSU 1 after primary	French oak barrels one year	egg white fining pad filtration
Gundlach-Bundschu Lance Cutler	23.5° or 25.0° Brix 3.4 pH 0.8 TA	0	before primary fermentation	Champagne	ML 34 at peak of primary	French and American oak barrels 10 months	pad filtration
Hargrave Vineyard Alex Hargrave	3.4 pH	0	0	Red Bordeaux	none	American and French oak barrels 12-15 months	polish filtration
Keenan Winery Joe Cafaro	22.7° Brix 3.35 pH 0.8 TA	40 ppm	before primary fermentation	Montrachet	44-40 at beginning of primary fermentation	Nevers barrels 15-18 months	egg white fining pad filtration
Louis M. Martini Michael Martini	22.5-23.0° Brix 3.2-3.3 pH 0.75 TA	80 ppm	before primary fermentation	Champagne	none	wood tank and barrels 2-2½ years	egg white fining DE filtration and pad filtration
Rutherford Hill Phil Baxter	23.0° Brix 3.3 pH 0.8 TA	75 ppm	after primary fermentation	Champagne	none	Nevers barrels 15-18 months	egg white fining two filtrations
Chateau Ste. Michelle Kay Simons		30-40 ppm		Red Pasteur	Leuconostoc at beginning of primary fermentation	American oak barrels one year or less	egg white fining
Sterling Vineyards Bill Dyer	22.5-23.5° Brix 3.4-3.5 pH	30 ppm	before primary fermentation	Montrachet	ML 34 after primary fermentation	Nevers barrels one year	egg white fining pad filtration
St. Francis Bob Robertson	22.5-23.0° Brix	0	after malolactic fermentation	Champagne	44-40 during primary fermentation	Nevers barrels one year	egg white fining

Franc in **Duckhorn** Merlot. "We blend for taste; if it needs a bit more bite, body or astringency, we vary the percentage accordingly," says Rinaldi. "Usually Cabernet will add backbone, structure. We have found Cabernet Franc fits the bill for this as well."

As for making a 100% Merlot, Rinaldi would not hesitate to do so if the wine was balanced and tasted right but he has not seen it yet. "I am afraid it would be appreciated early but would then fade. We did experimental lots in 1978 of 100% Merlot and they have since lost their charm."

Green adds Cabernet Sauvignon to **Firestone** Merlot to give it a tannic backbone and staying power. "Merlot by itself can be very fruity and Cabernet seems to firm up the palate, making it a more serious wine," says Green.

"The bottom line," says Cutler, "is that Cabernet makes it taste better. **Gundlach-Bundschu** Merlot, over a period of years, will develop into a lively grapey old wine, but it does not develop complexities that a fine aged Cabernet will. By putting some Cabernet into Merlot, you can get some of those complexities." Cutler emphasizes that Merlot is not a softer wine but that it is a fruitier wine.

In 1980, **Hargrave** added 10% Cabernet Sauvignon to their Merlot. "Our wine committee felt 10% Cabernet added just enough structure to the wine. The percentage is not fixed and is apt to change," says Hargrave.

"We blend a little Cabernet in Merlot to give the wine more spark," says Cafaro at **Keenan**, "Merlot by itself can be dull. Cabernet adds another dimension and a little more life."

1982 was the first time **Knudsen Erath** used any Cabernet Sauvignon in Merlot for this was the first year Cabernet Sauvignon vines came into production. Erath uses Cabernet to add backbone, to stiffen up the softness of Merlot.

"We blend Cabernet Sauvignon into Merlot if we feel it needs it, judging by the way it tastes," says **Martini**. "Often Cabernet can broaden the spectrum of the mouth feel. It gives the wine breadth more than depth." Martini has discovered Cabernet Sauvignon picks up French oak in a more complimentary way and attractively introduces oak nuances into the blend. Cabernet is not added for ageing purposes. Martini believes Merlot ages well on its own.

Rutherford Hill blends 15-20% Cabernet Sauvignon into Merlot. "Generally, Merlot alone can be a little too simple, too round," says Baxter, "Cabernet can give it a little more structure, direction and needed complexity."

Simons normally bottles **Ste. Michelle** Merlot as 100% varietal. "However, we've blended Cabernet Sauvignon into Merlot when we thought that it benefitted from it, such as in a particularly light year," says Simons.

Cabernet Sauvignon at **Sterling** is used to broaden the blend of Merlot, to add complexity. The concern is one of taste and balance more than a matter of trying to boost longevity of the wine. It is possible that Sterling may someday make a 100% Merlot but only if the wine could in no way be improved by some Cabernet.

St. Francis Merlot is always 100% Merlot, due mainly to the fact that St. Francis is an estate winery and no Cabernet Sauvignon is grown in the vineyard.

TASTING REPORT

A. 1977 Chateau Ste. Michelle-Washington

Color: medium deep garnet. slightly brown. deep brick red. light ruby.

Aroma: mature herbal Merlot scents. grassy, woodsy spice. slightly closed. integrated oak tones. slightly oxidized, aged characteristics.

Flavors: elegant forward fruit. soft, clean and quaffable. old musty wood. minty, simple.

Balance and Finish: a good balance of fruit and wood. light to medium body. hot, short finish. slightly tannic.

Comments: A lighter style of Merlot, simple and presently quite drinkable. With the exception of a slightly hot character and short finish, it is a balanced, well-made wine. It appears to be ageing quickly.

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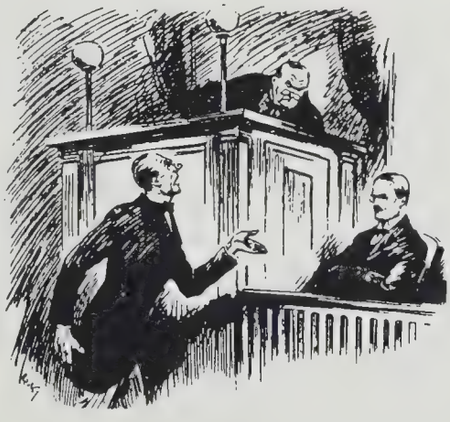
by
gerald weisl



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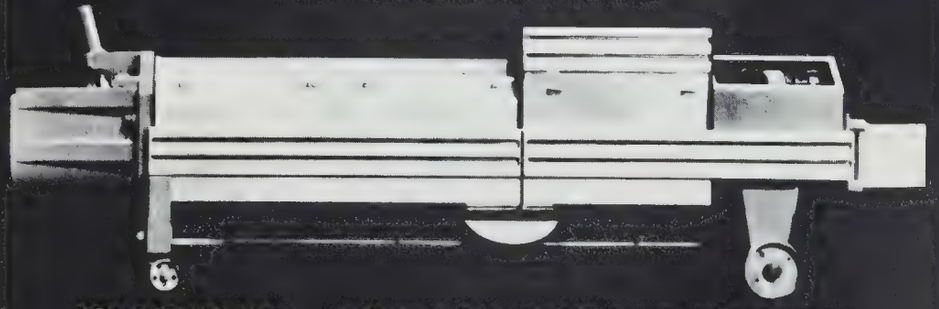

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B. 1979 St. Francis-Sonoma Valley, California

Color: deep garnet, nearly black. opaque, brick-red. deep ruby, dense, thick.

Aroma: rubber, tar. slightly plummy. vegetative. intensely alcoholic, herbal, woody overtones. Very ripe character. camphor-like nose. medicinal. bacterial, butyric qualities. an excess of oak.

Flavors: dirty, chalky, like chewing rubber. hard, herbal, forward. hot and very tannic. ripe flavors, pruney. soft and flat. a lot of oak and tannin.

Balance and Finish: out-of-balance. short, tannic finish. flat. a big wine, short on finesse.

Comments: Many felt this wine was faulted and could in no way be recommended due to a bacterial or butyric character both in the nose and mouth. Others found fruit flavors behind a somewhat off nose.

C. 1979 Louis M. Martini-California

Color: light ruby, clear, tawny. light cherry red.

Aroma: faint, closed. light pleasant fruit, slightly cheesy, pleasantly fruity. Beaujolais-style. fruity, grapey with noticeable oak. mint and smokey tones. an aged quality.

Flavors: little fruit, slight wood. good flavors in a lighter style. round, drinkable, soft and fruity. understated.

Balance and Finish: well-structured, medium body. light in style with a slight aged character. minty aftertaste. smooth, drinkable now.

Comments: Comparable in style to wine A, this wine is light, pleasant, easy to drink now, thought well-structured to age for five to eight years. Some felt it was too thin, unsubstantial, while others felt it had good flavors and fruit in a light simple style.

MERLOT TASTING PANEL at Louis M. Martini Winery.

D. 1979 Rutherford Hill-Napa Valley, California

Color: medium deep garnet. dark. opaque purple-red.

Aroma: rich, earthy, green spice. full of varietal fruit, a strong cherry-like fruitiness. clean, complex. some vegetative aromas, subtle fruit and some wood. powerful, heavier style.

Flavors: subtle flavors. pleasant, berries, soft and smooth. good fruit, forward astringency. a bit hollow and flat for its intensity. chewy. young, complex, rich. very tannic, huge wine.

Balance and Finish: sturdy structure, tannic. needs time to age. velvety in the mouth. low in acid for long range ageing. well-balanced with plenty of tannin. slightly hot, tannic finish.

Comments: A rich, big, lush style of Merlot for further ageing. While slightly tannic presently, the rich fruit and structure should age well. Appreciated by most of the tasters, though not for current drinking.

E. 1979 Keenan-Napa Valley, California

Color: deep garnet. dense, opaque, dark. cloudy. flourescent red edge. inky.

Aroma: powerful, young fruit. violets. ripe, smokey, raisiny, woody. rich blackberry, black pepper nose. peppermint. French oak. distinctively ripe Merlot.

Flavors: fresh, forward fruit. big monster style. tannic. rich in the mouth but young, tannic and astringent. over-oaked. young and hard.

Balance and Finish: a slightly harsh tannic finish. slightly hot. awkward, bulky, unresolved, clumsy. astringent, hot aftertaste.

Comments: Generally felt to be an intense, powerful, big style of Merlot with hard young fruit. Most felt it was quite tannic, over-oaked, somewhat awkward and out-of-balance.

F. 1979 Clos du Val-Napa Valley, California

Color: deep red garnet. brilliant ruby red with a tawny edge.

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Aroma: rich, fruity, slightly closed in. attractively pungent, a Cabernet-like herbaceousness, slightly vegetal. tea-leaf aromas. berries with wood background. complex, well-married nose.

Flavors: fruity. chocolate. slightly thin and straightforward. herbaceous. soft tannins, lacks acid. sweetish oak.

Balance and Finish: straightforward, firm structure. full-bodied. harmonious in all elements, elegant. excellent ageing potential yet well-balanced now. a bit hot, an almost sweet finish. soft in the mouth. long fruity finish.

Comments: The majority felt this wine was extremely well-made, well-structured, balanced with elegant straightforward flavors and aromas. Some felt it was the most 'varietal' of the group yet others commented it had definite Cabernet characteristics.

G. 1979 Duckhorn Vineyards-Napa Valley, California

Color: deep cherry red, purple. thick, dull. intense garnet.

Aroma: coconut, violet-type fruit with some mintiness. light herbal quality. restrained, light tobacco, earthy. plums, cherries. overripe fruit, some overpowering fermentation odors.

Flavors: fruity, overripe. slightly astringent and harsh, noticeable volatile acidity in the mouth. some tannic bitterness. full, good acid and body. promises future riches.

Balance and Finish: well-made, well-structured, good balance, nice finish. lingering aftertaste. a bit light, drinkable now. some harshness.

Comments: While the wine appeared closed, it had the structure and balance to age well and an impression of considerable fruit. Mixed impressions existed. Some felt it was quite drinkable while others felt it would benefit from several years of bottle age.

H. 1979 Sterling Vineyards-Napa Valley, California

Color: deep brick red-purple. orange hue. clear.

Aroma: light strawberry fruit. sandlewood. scented bath soap. slight raisiny-pruney nose. tawny port impression. floral, buttery, berries. strong, young and generous fruit. slightly dirty.

Flavors: overripe fruit, slightly port-like. chocolate. soft tannins. nice balance of fruit and oak. clean, rich mouth with some astringency. complex, rich, harmonious. slightly low in acid.

Balance and Finish: elegant, perfect balance. enjoyably drinkable soft, bitter aftertaste. slightly tannic. smooth, lush. medium body.

Comments: Well-balanced, smooth and rich, 'the richest of the bunch', in Merlot aromas and flavors. Found to be quite drinkable now but some felt a few 'rough edges' would smooth out with further age.

I. Gundlach-Bundschu-Sonoma Valley, California

Color: deep, brick red. ruby, purple with a tawny edge. intense garnet.

Aroma: ripe cherries. cranberry, tobacco, earthy, Cabernet-like with fruit and herbs. a spicey floral component, delicate perfume. black pepper. nice wood in background. slightly vegetal, green character.

Flavors: lots of fruit, nicely balanced with wood/vanilla. a little short in acid, full-bodied. sweet chocolate flavor. directed, lean, a touch short on flavor complexity. tannic, with strong fruit to match. full, rich ponderous in mouth. smooth and straight forward.

Balance and Finish: well-structured, hard. a heavier, more tannic style, still quite young and showing it. a heavy style with a dirty finish. long rich aftertaste.

Comments: There were mixed opinions on the style of this wine, some feeling it was too young, green and heavy at present, needing at least five years of age, while others felt it was simple and easy to drink. Either way, the wine was appreciated for its sound structure, balance and full flavors.

J. Hargrave Vineyard-Long Island, New York

Color: deep brick, ruby red. slightly amber, clear.

Aroma: smokey, ripe fruit. deep briary nose with noticeable American oak. open herbaceousness of Cabernet Sauvignon-like intensity. cedar, smoldering wood, cigar box. young fruit, overpowered by American oak.

Flavors: slightly vegetal flavors detract from an overall pleasant mouth feel. lacks acid, a bit flat. simple, soft. A charred-type character, slightly bitter. Hollow in the middle of the mouth with good varietal flavor and soft oak tannins. slightly oxidized. flavors of old American oak.

Balance and Finish: over-oaked. American oak dominates. thin finish. slightly bitter. simple. light-weight.

Comments: It was generally agreed that the predominance of American oak overwhelmed the nicer qualities of the wine, the light spicey fruit and simple flavors. It is a simple, approachable wine for current drinking.

K. 1978 Firestone-Ambassador Vineyard, Santa Ynez Valley, California

Color: light, clear red. slight amber tinge.

Aroma: light pleasant herbs and ripe fruit. cedar, tobacco. nice balance of oak. powerful. pungent, moldy cabbage. overcooked vegetables.

Flavors: interesting fruit and herb complexity. strawberry. berries. soft French oak tones. overripe, volatile, hot quality. rich mouth feel, medium body. moderate tannin.

Balance and Finish: nice soft oak and fruit balance. slightly hot sour. long attractive finish.

Comments: A controversial wine, stirring many differences of opinion. Some were quite annoyed and repulsed by the vegetal stinky, to the the point of flawed, aromas. Others enjoyed the wine very much for its varietal qualities and interesting complexity. Some that did not like the aromas, did like the full flavors and feel of the wine.

L. 1979 Knudsen Erath-Dundee, Oregon

Color: dark ruby red, purple, slight brown edges, clear.

Aroma: full, forward herbal nose, rich wood scents, a slight pickled smell, green olives, moist earth and spice, upfront grape smells, developed ripe fruit.

Flavors: full fruit, herbs, slight chalky, thick texture, astringent, green, slight stemmy quality, low in acid, clumsy young fruit, a bit rough, tannic.

Balance and Finish: low in acid, rough greenness and tannin intimidates fruit, astringent, hot finish, slight chocolate-cocoa aftertaste.

Comments: Most tasters noted a green-tannic quality without being overoaked or woody. This astringency tended to detract from the rich fruit and body. Some felt the wine lacked structure, a characteristic of most Merlots, which may have been helped with some additional Cabernet Sauvignon.

REFRIGERATION: Ammonia or Freon?

In this report, Gerald Linton, president of A & A Mechanical Refrigeration Inc., San Jose, CA., offers his opinion and information to dispel the myths and exaggerated claims surrounding the suitability of ammonia versus freon in winery refrigeration systems.

Definition

Refrigerants are fluids utilized in mechanical refrigeration systems whose characteristics lend themselves favorably to vaporization, vapor compression, vapor condensing and the subsequent re-vaporization for the purpose of absorbing, transferring and rejecting heat.

SUITABILITY AND CHARACTERISTICS

No one refrigerant possesses all of the characteristics to be considered ideal, inasmuch as refrigerant characteristics affect each other and the application as a whole. Thermodynamic, physical and chemical properties will determine the most efficient refrigerant. However, many other factors will tend to override selection of the most efficient as the most suitable. The most suitable or ideal refrigerant will be the one which possesses the overall combined characteristics of the most efficient as well as the most practical, relative to the specific application.

PRACTICAL CONSIDERATIONS

Some important practical considerations for selecting a refrigerant are: availability of the fluid, initial cost of construction materials, amount of fluid in containment, ease of leak detection, compatability of all materials with construction, reaction with heat, moisture and oil, safety, maintenance, quality of compressor regarding volumetric efficiency, handling, and availability of qualified service technicians.

PERFORMANCE CHARACTERISTICS

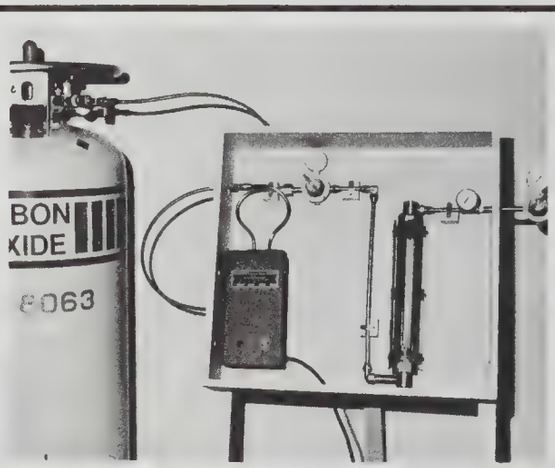
Some important considerations for selecting a refrigerant for efficient performance are: a high latent heat of vaporization, a low compression ratio, a high critical temperature and pressure, a high thermal conductivity, a high coefficient of performance, a low discharge temperature, a moderately high vapor density, a low condensing pressure at an optimum condensing temperature, and a high evaporator pressure relative to an ideal saturated evaporator temperature.

SPECIFIC REFRIGERANT CHARACTERISTICS

Numerous fluids are commercially available whose characteristics make them suitable to be utilized as refrigerants. However, many have one or more negative properties that tend to offset their best qualities, such as the high horsepower per ton of ethane (R170), the high condensing pressure of carbon dioxide (R744), and the high compressor displacement per ton of freon (R11). For this reason I have eliminated them from consideration. Of the five most desirable, listed in the following table, we have selected the two most ideal for this

Table 7 Comparative Refrigerant Performance Per Ton
Based on 5 F Evaporation and 86 F Condensation[a]

Refrigerant No.	Refrigerant Name	Evaporator pressure, psig	Condensing pressure, psig	Compression Ratio	Net refrigerating effect, Btu/lb	Refrigerant circulated, lb/min	Liquid circulated, in.^{3}/min	Specific volume of suction gas, ft^3/lb	Compressor displacement, cfm	Horsepower, hp	Coefficient of performance	Comp. discharge temp, F
717	Ammonia	19.6	154.5	4.94	474.4	0.422	19.6	8.15	3.44	0.989	4.76	210
500	12/152a Azeotrope[b]	16.4	112.9	4.12	60.6	3.30	80.3	1.50	4.95	1.01	4.65	105
12	Dichlorodifluoromethane	11.8	93.3	4.08	50.0	4.00	85.6	1.46	5.83	1.002	4.70	101
502	22/115 Azeotrope[b]	36.0	175.1	3.75	45.7	4.38	99.4	0.82	3.61	1.079	4.37	99
22	Chlorodifluoromethane	28.2	158.2	4.03	70.0	2.86	67.4	1.24	3.55	1.011	4.66	128



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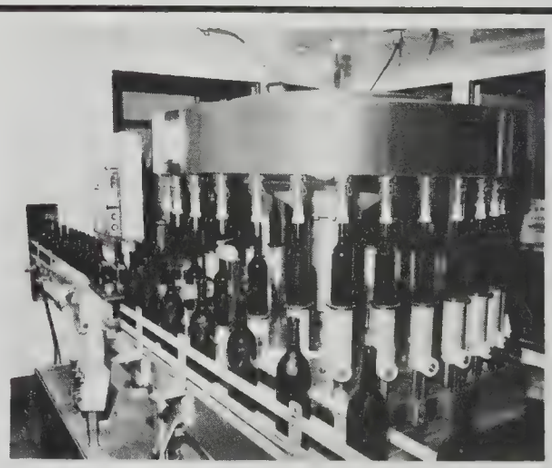

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comparison: FREON (R22) and AMMONIA (R717). Columns #3, 8, 9, 10 and 11 denote compression ratio, compressor displacement per ton, horsepower per ton, coefficient of performance, and compressor discharge temperature. It can be readily seen that AMMONIA (R717) as expressed is approximately 2% more efficient than FREON (R22).

COMPRESSOR RATINGS

The following tables reflect certified ratings in refrigeration tons of a reciprocating refrigeration compressor at a constant RPM with 5°F liquid subcooling, utilizing AMMONIA and FREON. For convenience of comparison, we have taken the liberty of selecting +5°F saturated suction and 100°F saturated discharge, a reasonably desirable condensing temperature and the lowest required refrigerant evaporating temperature in processing and storage of wines.

Note that AMMONIA at the stated conditions is approximately 2.8% more efficient than FREON, each requiring identical shaft horsepower. At 40°F saturated suction and 100°F saturated discharge, AMMONIA is now approximately 10.5% more efficient, however in the event of superheating of the suction vapor, due to useful work AMMONIA will be derated as much as 5%, whereas superheating will have little effect on FREON. Most engineering manuals report AMMONIA to be theoretically 4.6% more efficient than FREON at 40°F saturated suction and 100°F saturated discharge. Loss of efficiency due to greater oil vapor displacement required in the FREON system is offset to a greater degree by the advantage of total lubrication of all components.

R22

Sat. Disch. Temp. And Pressure	Sat. Suction Temp. (F)	Sat. Suction Press. (PSIG)	TONS CAP.	BHP	MBH
100 (195.9 PSIG)	−35	2.1	7.63	24.2	153
	−30	4.9	9.39	27.1	181
	−25	7.4	11.3	29.9	212
	−20	10.2	13.5	32.9	245
	−15	13.2	15.8	35.8	281
	−10	16.5	18.4	38.7	319
	−5	20.1	21.2	41.6	360
	0	24.0	24.3	44.3	404
	5	28.2	27.7	46.9	451
	10	32.8	31.3	49.3	501
	15	37.7	35.2	51.3	553
	20	43.0	39.5	53.3	609
	25	48.8	44.1	55.0	669
	30	54.9	49.1	56.6	733
	35	61.5	54.4	57.8	800
	40	68.5	60.2	59.1	873
	45	76.0	66.4	60.1	950
	50	84.0	73.0	61.2	1032

R717

Sat. Disch. Temp. And Pressure	Sat. Suction Temp. (F)	Sat. Suction Press. (PSIG)	TONS CAP.	BHP	MBH
100 (197.2 PSIG)	−5	12.2	20.9	41.1	355
	0	15.7	24.5	44.1	406
	5	19.6	28.5	46.9	461
	10	23.8	32.9	49.5	521
	15	28.4	37.7	52.0	584
	20	33.5	42.9	54.2	652
	25	39.0	48.6	56.3	726
	30	45.0	54.7	58.1	805
	35	51.6	61.5	59.7	889
	40	58.6	68.7	61.0	979
	45	66.3	76.4	61.9	1074
	50	74.5	84.8	62.7	1177

* Tons of Refrigeration - 1 Ton = 12,000 BTU's/Hr.
** Brake Horsepower/Actual Horsepower
*** MBH - Thousands of BTU's/Hr.-Total Heat Rejection

SUITABILITY TO WINERY APPLICATION

Since we have established that AMMONIA and FREON are fluids comparable to each other in their ability to produce a refrigeration effect, it becomes imperative to compare the manner in which coolant is cycled to derive the greatest benefit, best suited to each refrigerant's performance.

COMPRESSOR AND CONDENSER

Compressors compatible with either refrigerant are readily available. The higher precision in manufacturing will usually produce a higher volumetric efficiency and only initial cost need be considered. For efficient heat rejection at optimum condensing temperatures, use of the evaporative condenser for water cooled heat rejection is desirable. This holds true for both refrigerants. However, use of air-cooled heat rejection utilizing FREON at higher condensing temperatures is gaining wide acceptance for production of abundant quantities of hot water for general winery use.

EVAPORATOR

Since vaporizing of the fluid is the sole purpose for the entire refrigeration system, the whole system is dependent upon efficient operation of the evaporator. Good evaporator design is concerned with high heat transfer and sound practical consideration of the refrigerant's characteristics to insure freedom from operational difficulties, such as oil logging, liquid carry-over, and excessive superheating of suction vapor, all of which are damaging to refrigerant compressors.

In cooling glycol, good evaporator design is easily achieved, whereas configuration and style of the evaporator as an integral part of the fermenter limits to a significant degree, suitability of the type of refrigerant feed system to achieve optimum heat transfer and a trouble-free operating system.

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Cooling or heat transfer surfaces most commonly used in the wine industry are 'stainless steel' jackets welded to sides of fermenting tanks. These jackets are described in wine industry vernacular as 'high' and 'low' pressure. A more suitable definition of these words in refrigeration vocabulary would be 'direct expansion' and 'indirect refrigeration'.

Both AMMONIA and FREON are used in the aforementioned systems and, with an understanding of the idiosyncracies of each, can be utilized in the same comparable and efficient manner.

DIRECT EXPANSION

Direct expansion is defined as direct feeding of the high pressure heat transfer surface on the jacketed fermenter with high pressure refrigerant fluid, making the jacket a true refrigerant vaporizer. Methods of direct expansion feeding are 'dry expansion' and 'liquid overfeed recirculation'.

DRY EXPANSION

Dry expansion requires use of a 'thermal expansion valve' for refrigerant feeding and controlled superheating of suction vapor leaving the evaporator. This method is best suited to FREON. Configuration of the high pressure evaporator relative to the moderately high flow rate of fluid requiring larger valve orificing results in accurate metering, good superheat control, and thoroughly wetted surfaces. Miscibility of FREON and oil enhances continuous sweeping or cleaning of evaporator surfaces, resulting in excellent heat transfer and entrainment of oil in the suction returns to the compressor. AMMONIA, on the other hand, has a low refrigerant flow rate and is immiscible with oil and, when used with a thermal expansion valve, can lead to fouled heat transfer surfaces (gas bubbles and oil), oil logging, poor superheat control, liquid slugging of the compressor, or excessive superheat of the suction vapor, all of which results in damage to the compressor and improper function of the entire refrigeration system.

The strongest suit for FREON versus AMMONIA is the initial cost of purchasing construction materials, lower labor costs for installation and availability of qualified FREON refrigeration mechanics for service.

DIRECT WET EXPANSION

An efficient method of direct expansion, suitable to high pressure fermenters, is the 'liquid overfeed' or 'liquid recirculation system'. This system is suitable for both AMMONIA and FREON, producing high heat transfer due to excellent distribution and thoroughly wetted heat transfer surfaces, clear of gas bubbles and oil.

Due to its liquid vapor disengaging vessel, it can insure against high vapor superheat and refrigerant liquid entering the compressor. It can provide for convenient extraction of oil from the evaporator side of the system and accomodate automatic return to the compressor or removal of same from the system.

Liquid overfeed tends to insure long compressor life and is inherently compatible with the physical properties of refrigerants. Initial cost of the system is greater and additional maintenance is required. Reasonably priced, qualified service technicians are not readily available and 'liquid overfeed' is not economically feasible for small systems. Unless operating engineers or qualified in-house maintenance is utilized, use of 'liquid re-circulation system' is not recommended for winery refrigeration.

INDIRECT EXPANSION

Indirect refrigeration is cooling of the 'glycol brine' by refrigerant fluid and the pumping of the chilled glycol to low pressure jackets on the fermenters. Both AMMONIA and FREON are well suited and compare favorably in this application. AMMONIA normally requires use of low speed, heavy duty compressors, as compared with commonly used high speed FREON compressors. Additionally, the compact, highly efficient and inexpensive refrigerant evaporators that are used with FREON fluids are not available for use with AMMONIA.

Glycol brine is the safest application for winery use. Containment of high pressure fluid makes isolation of either fluid possible while chilled glycol, suitable for all winery cooling requirements (fermentation, stabilizing, cellar and case goods cooling, must chilling, controlled environmental and air conditioning), is pumped harmlessly throughout the winery.

Advantages of the glycol brine system are many. The system's ability to control, divert, modulate and proportion flow justifies it being considered an excellent choice for winery refrigeration.

OIL & MOISTURE

AMMONIA is normally non-reactive with metals, however, due to its affinity for moisture, immiscibility with oil and high discharge temperature, it can become corrosive

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FREON, on the other hand is miscible with oil, has a low discharge temperature and is basically non-corrosive when operating in a reasonably dry system. Its miscibility with oil insures a well lubricated compressor and a properly installed system, free of excessive superheat or liquid slugging, can operate for many years with minimal preventive maintenance.

SAFETY and LEAK DETECTION

AMMONIA is a pungent, irritating, asphyxiating refrigerant whose self-alarming characteristics makes its presence and leak detection a simple matter. Good ventilation is required with AMMONIA due to its explosive properties at high concentrations.

FREON is basically non-toxic, odorless and non-flammable but can cause suffocation by oxygen deficiency. In the presence of fire, FREON forms by-products that are highly toxic. Leak detection is difficult and usually requires the services of qualified technicians.

Table 11 Relative Safety of Refrigerants

Refrigerant No.	Refrigerant Name	ANSI B9.1 - 1971 Safety Code Group	Underwriters' Laboratories Group Classification	Explosive Limits in Air, % by Volume
502	. . .	1	5a	Nonflammable
22	Chlorodifluoromethane	1	5a**	Nonflammable
717	Ammonia	2	2*	16.0 to 25.0
500	. . .	1	5a	Nonflammable
12	Dichlorodifluoromethane	1	6*	Nonflammable

Table 12 Underwriters' Laboratories Classification of Comparative Hazard to Life of Gases and Vapors

Group	Definition	Examples
2	Gases or vapors which in concentrations of about ½ to 1 percent for durations of exposure of about ½ hour are lethal or produce serious injury.	Ammonia Methyl Bromide
5a	Gases or vapors much less toxic than Group 4 but more toxic than Group 6.	Refrigerant 11 Refrigerant 22 Carbon Dioxide
6	Gases or vapors which in concentrations up to at least about 20 percent by volume for durations of exposure of about 2 hours do not appear to produce injury.	Refrigerant 12 Refrigerant 114 Refrigerant 13B1

SUMMATION

AMMONIA (R-717) is a refrigerant possessing a high latent heat of vaporization and a moderately low vapor density, making it suitable for flow at low pressure drops where compressors, condensers and evaporators are separated by great distances, and pressure drops can be excessive.

Low liquid feed rate and immiscibility with oil make AMMONIA undesirable for thermal expansion valve metering. Its affinity for moisture and high discharge temperature can cause corrosive behavior and carbonization of lubricating oil, leading to operational difficulties requiring inspection and periodic maintenance.

Cost of AMMONIA per pound is low, but the amount of fluid in containment when used with wet direct expansion is large. Initial cost of equipment, additional maintenance, and lack of local qualified service technicians make AMMONIA the ideal refrigerant suitable for large industrial plants.

FREON (R-22) is a refrigerant having a moderately low latent heat of vaporization and high vapor density making it ideal for close coupled automatic commercial and light industrial applications. It has a low discharge temperature, is miscible with oil and superheating of its suction vapor does not affect its compressor's lubrication or efficiency.

It is most efficient when used with thermal expansion valve metering, and with proper design, returns oil to its compressor automatically. Its cost per pound of refrigerant is high, but the amount of fluid in containment when used with dry expansion is low.

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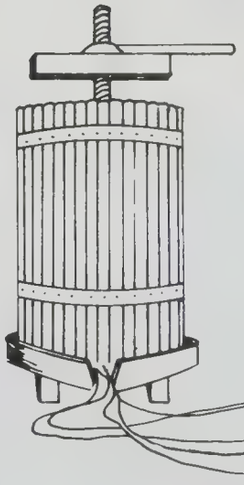

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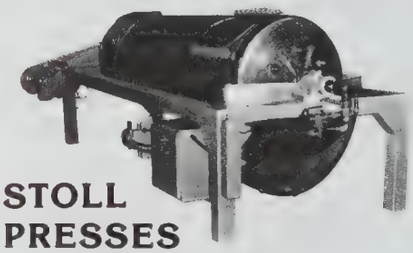

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BARRELS AND WINE

By DENIS KELLY

While at Villa Mt. Eden Winery in the Napa Valley, winemaker Nils Venge made a series of Cabernet Sauvignons, Chardonnays and Pinot Noirs that combined intense varietal character with subtle undertones of oak. The wines gained Nils a reputation for achieving beautiful balance between fruit and oak and all showed real care in selecting the most suitable type of oak for the variety.

Venge recently moved just down the road to start a new venture with Dennis Groth, Atari Corporation V.P., called Groth Vineyard and Winery where he is now winemaker and general manager. We discussed Nils' plans at Groth and his thoughts about barrels and wine.

Groth Vineyards and Winery has 120 acres in Cabernet planted in 1973 and 1974 and some Chardonnay and Sauvignon Blanc. More Chardonnay will be going in next to the winery site near the Oakville crossing, but for the first few years the winery will be buying grapes for this variety.

Groth also owns the Hillview Vineyard near Yountville with 25 acres of Sauvignon Blanc and 15 acres of Merlot. The winery crushed 150 tons of Cabernet and Sauvignon Blanc in 1982 and will concentrate on these varieties along with Chardonnay.

Nils is currently involved in purchasing cooperage and equipment for the winery which will be built in a two phase program over 1983 and 1984. His first cooperage purchase was 283 Nevers oak barrels and 100 Limousin from Demptos, some coopered in France and some in the Napa Valley. I asked him why Demptos and why Nevers and Limousin?

NV: Mainly because they could take such an order on short notice. They're good barrels and I'll use the Limousin first for my 1982 Sauvignon Blanc and the Nevers for this vintage's Cabernet Sauvignon and Merlot. I usually prefer a mix of coopers. At Villa Mt. Eden, I used Demptos, Nadalie and Boutes. But Demptos seems to be gearing up to service the California market and they could fill the order quickly.

When I say a mix, however, I mean coopers and not types of wood. At Villa Mt. Eden, we did a lot of experimenting and I found that mixing types did not work well. Some people like a mix of Nevers and Limousin for Cabernet, but I feel that the cinnamon/vanilla quality of Limousin does not blend well with Nevers.

If I was going to mix oaks, I'd probably choose Nevers and American. I use Limousin oak for both Sauvignon Blanc and Chardonnay and I'm careful not to over-oak them. Limousin has an aggressive flavor. I strip out some of the smokey, roasted oak flavors with soda ash and warm water before I use new barrels. Not an overnight soak, but just enough to take out those harsh tannins and flavors.

DK: What about Cabernet Sauvignon? The Villa Mt. Eden Cabernets always seemed to have just the right level of oak flavor to my taste.

NV: I prefer Nevers oak for Cabernet. I tasted a Cabernet recently and picked out the Limousin character right off.

Limousin has too much of a woody flavor. If I wanted to put a red wine in Limousin I'd choose Zinfandel. Zinfandel's floral, berry character blends in nicely with the spicy cinnamon flavors of Limousin. But Cabernet's herbaceousness just doesn't fit. Cinnamon and berries sound fine; but cinnamon and green olives don't exactly mix too well.

DK: What about other types of oak?

NV: At Villa Mt. Eden, I experimented with various types. I aged the same Chardonnay in different woods, including Troncais and Allier. The Troncais added an unusual, rough, almost hot-oxidized flavor. The Allier was more subdued, more like Nevers. Right now, I am ageing Cabernet from my own vineyard in different barrels: one older (1974) Nevers barrel that has been shaved, an Allier barrel I used in the Chardonnay experiment, a four-year-old Limousin barrel and a used Nevers barrel with an Innerstave I got from Bob Rogers of Custom Cooperage.

I am not exactly sure what wood Bob used for the staves, but I think they are a mixture of Limousin and Nevers. I am real curious about this one. I am trying to get a Vosges barrel from the forest in North Central France. I've been using Vincent Bouchard of Le Tonnellerie de Bourgogne as a source for these barrels.

DK: How about American oak?

NV: I think that wine in new barrels gets too harsh and woody very quickly. I tried some Cabernet in air-dried American oak barrels that used wood that had been dried for five years and it was still rough and tough. After six months, the oak was too obvious in the wine compared with Nevers oak.

At Villa Mt. Eden, I decided on Nevers for Cabernet and Limousin for Chardonnay, Pinot Noir and Chenin Blanc. I think I'll stick to pretty much the same program here at Groth. I'll age our Sauvignon Blanc three months in Limousin; the fruit from the Hillview Vineyard does not have a strong grassy character and we'll pick at about 22 or 23° Brix. Lower sugar levels seem to accentuate the grassiness and might require more oak to balance the flavors.

I'll keep the Chardonnay six or seven months in the same barrels. With Cabernet, I'll follow the same two-year program in Nevers oak. Price certainly is a factor for American oak and you might be able to use some in a total blend, but to my taste Nevers oak makes a more palatable wine.

DK: At Villa Mt. Eden, you were using a mix of older and newer barrels for your Cabernet, do you think two years in new barrels might be too much?

NV: Well, I'll certainly have to be careful and not overoak the wine. It is just a question of keeping on top of the wine. One thing people have found lately is that wine that has not been DE or lees filtered prior to barrel ageing will pickup less oak flavor than a 'cleaner' wine. Wine seems to absorb flavors quickly, good or bad, and maybe if you strip out some flavors it will pick up whatever it can right away. I'll be processing the Cabernet as little as possible. I'll egg-white fine it and give it a polish filtration at bottling if it needs it.

DK: What are your plans for Groth Vineyards?

NV: We expect to be at the 30,000 case level in about three years. These will be split equally among the three varieties, Cabernet, Sauvignon Blanc and Chardonnay. We might go heavier into Cabernet, once reds start moving on the shelf again, as I expect they will. When the Chardonnay and Sauvignon Blanc come into full production, all the wines will be made from our own grapes.

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Effect of Bacterial Inoculum Levels On The Stimulation Of Malo-Lactic Fermentation

By James F. Gallander, Department of Horticulture
Ohio Agricultural Research & Development Center
Wooster, Ohio

ABSTRACT

Red table wines were made from two French hybrids, DeChaunac and Chancellor, in 1977 and 1978. At pressing, the wines from each variety were divided into four lots. One lot was used as a control, and the other lots were inoculated with **Leuconostoc oenos** at varying levels of 0.5, 1.0, and 2.0% (v/v). A natural malo-lactic fermentation was present in the control wines, but was found to proceed at a much slower rate than the inoculated wines.

The greatest stimulation of malo-lactic fermentation occurred in the 1977 DeChaunac wines. Natural malo-lactic fermentation was completed in 51 days, whereas, wines inoculated with 0.5, 1.0 and 2.0% inoculum completed in 26, 20 and 17 days, respectively. Malic acid content in the malo-lactic wines was 0.2% or less.

When grapes are grown in a relatively cool region, such as the northeastern United States, their acidity is usually above the acceptable level for making table wines. Therefore, some method must be employed during their vinification to lower wine tartness.

One practice is to encourage malo-lactic fermentation, which is the bacterial conversion of malic acid to lactic acid and carbon dioxide. This fermentation occurs after the alcoholic fermentation and is due to the growth of certain lactic acid bacteria.

In addition to reducing wine acidity, malo-lactic fermentation also contributes to wine complexity, especially in red wines. This fact is so important that many enologists feel that malo-lactic fermentation is essential even in some warm regions, where wine deacidification is not necessary. Another important benefit of malo-lactic fermentation is bacteriological stability which results from removing malic acid from the wine (9).

Since malo-lactic fermentation has several advantages, studies have been directed towards the stimulation of this fermentation in wines. Several review papers have covered the numerous factors which affect this bacterial fermentation in wines (3,7,9,10).

Enologists agree that the initiation of a rapid and predictable fermentation is often difficult. This is especially true when winemakers rely on a natural malo-lactic fermentation. To help overcome the inconsistency of malo-lactic fermentation, interest has been given to the use of pure culture inoculation of wine (2,5,6,7,9,10).

Most studies concerning bacterial inoculation have been with strains **Leuconostoc oenos.** Kunkee (9) discussed the application and preparation of **Leuconostoc oenos** ML-34 for inoculating wines. More recently, Beelman et al. (2) isolated a new strain (PSU-1) for inducing malo-lactic fermentation.

They also discussed the importance of inoculating wines with strains which are adapted to local conditions. Gallander (6) using PSU-1 studied the effect of inoculation at different stages of alcoholic fermentation on the rate of malo-lactic fermentation. In all wines, malo-lactic fermentation was stimulated when inoculated during and after alcoholic fermentation.

The present study is concerned with the effect of bacterial inoculum levels on the rate of malo-lactic fermentation. The results have application in improving the consistency of inducing malo-lactic fermentation, particularly in wines from overly acidic grapes.

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MATERIALS AND METHODS

Must preparation: Grapes from two French hybrids (DeChaunac and Chancellor) were harvested in 1977 and 1978 from a commercial vineyard in southern Ohio. After the grapes were destemmed and crushed, the musts were analyzed for soluble solids (° Brix) and treated with 50 ppm sulfur dioxide in the form of potassium metabisulfite. The musts were then ameliorated with sucrose to 20% soluble solids.

Vinification: The must from each variety was divided into four lots (24 l each) and duplicated. One lot of each variety was used as a control, and the other three lots were used for bacterial inoculation at different levels of inoculum.

Twelve hours after sulfur dioxide treatment, each lot was inoculated with 1% (v/v) active yeast culture of **Saccharomyces cerevisiae** (Montrachet #522 strain). The lots were stirred twice daily and were pressed at approximately 8° Brix. The fermenting musts were transferred to glass carboys and were placed in 18°C storage to complete fermentation.

When the wines were essentially dry for five days, they were racked into clean carboys. After malo-lactic fermentation, the wines were again racked and then cold-stabilized (-2°C for three weeks), bottled, and analyzed after three months storage at 18°C.

Bacterial inoculation: When the wines reached dryness, three lots of each variety were inoculated with different levels of bacterial inoculum: 0.5, 1.0, and 2.0% (v/v). The bacteria (**Leuconostoc oenos** PSU-1) was obtained from R.B. Beelman, Pennsylvania State University, University Park. The bacteria was grown in previously sterilized grape juice with yeast extract (0.05%) and adjusted to pH 4.5. After six days of incubation at 25°C, the grape juice cultures (about 10^8 cfu/ml) were used for bacterial inoculation.

Wine analysis: Soluble solids (° Brix), pH, total acidity, volatile acidity (Cash Apparatus), and tartaric acid were determined as described by Amerine and Ough (1). L-malic acid was determined enzymatically with malic dehydrogenase (11). Malo-lactic fermentation was monitored by using paper chromatography (5). Results were expressed as number of days for completion of malo-lactic fermentation (absence of malic acid), beginning with first day of alcoholic fermentation.

RESULTS AND DISCUSSION

Results of the must composition indicated that the soluble solids were highest for Chancellor in 1977, 17.7% (Table 1). pH values varied widely with Chancellor (1978) having the lowest 3.08 and DeChaunac (1978) the highest value, 3.24. Most of the total acidities were above the acceptable level for table wines. In 1978, Chancellor was highest at 1.06%.

Although a natural malo-lactic fermentation occurred in the control wines, it was slower than the inoculated wines (Table 1). For example, the DeChaunac wines in 1977 with 0.5, 1.0, 2.0% inoculum completed malo-lactic fermentation in 26, 20, and 17 days, respectively, whereas, the controls underwent conversion in 51 days.

These results demonstrated that a large inoculum (2.0%) resulted in the most rapid malo-lactic fermentation. Similar results also were obtained for the wines Chancellor (1977) and DeChaunac (1978).

However, the Chancellor (1978) wines underwent a much slower natural malo-lactic fermentation (incomplete), 180 days. This also was found in the inoculated wines with 0.5%

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inoculation finishing the secondary fermentation in 149 days. Since these wines were lowest in pH, it was not surprising that malo-lactic fermentation was delayed. Low pH has been found to be a major factor inhibiting malo-lactic bacteria in wines. Bousbouras and Kunkee (4) demonstrated that the rate of malo-lactic fermentation was positively dependent on the initial pH of the wine.

Wines from malo-lactic fermentation contained small amounts of malic acid, less than 0.2%. The loss of malic acid brought about a decrease in total acidity and an increase in pH. The increase in pH levels caused the tartrate content of the malo-lactic wines in 1977 to be lower than the control wines (before malo-lactic fermentation). All volatile acidity values were similar and they were below the U.S. legal limits.

In summary, malo-lactic fermentation was induced in all wines by bacterial inoculation. The greatest stimulation occurred at the highest level of inoculation, 2.0%. At this level, the rate of malo-lactic fermentation was about twice that of the control samples. It can be concluded that large amounts of bacterial inocula may be favorable in inducing a more consistent and rapid malo-lactic fermentation.

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Table 1. Effect of bacterial inoculum levels on the rate of malo-lactic fermentation in red table wines, 1977-78.

LEVEL OF INOCULUM %	SOLUBLE SOLIDS (°B)	pH	TOTAL ACIDITY[c]	VOLATILE ACIDITY[d]	TOTAL TARTRATES g/100 ML	TOTAL MALATES g/100 ML	DAYS TO COMPLETE M-L FERMENTATION
				DeChaunac, 1977			
Must	16.8	3.18	0.92	–	–	–	–
Control[a]	–	3.48	0.82	0.10	0.18	0.36	–
Control[b]	–	3.76	0.55	0.09	0.13	Trace	51
0.5	–	3.77	0.55	0.08	0.12	Trace	26
1.0	–	3.76	0.55	0.07	0.11	Trace	20
2.0	–	3.75	0.54	0.07	0.12	Trace	17
				Chancellor, 1977			
Must	17.7	3.19	1.03	–	–	–	–
Control[a]	–	3.53	0.79	0.06	0.16	0.35	–
Control[b]	–	3.71	0.57	0.05	0.12	Trace	51
0.5	–	3.72	0.59	0.06	0.13	Trace	43
1.0	–	3.71	0.58	0.05	0.13	Trace	41
2.0	–	3.72	0.60	0.05	0.12	Trace	36
				DeChaunac, 1978			
Must	17.6	3.24	0.98	–	–	–	–
Control[a]	–	3.48	0.75	0.05	0.16	0.32	–
Control[b]	–	3.68	0.49	0.05	0.14	0.03	51
0.5	–	3.62	0.47	0.06	0.14	0.01	28
1.0	–	3.63	0.47	0.04	0.15	0.01	23
2.0	–	3.62	0.45	0.06	0.14	0.01	20
				Chancellor, 1978			
Must	14.5	3.08	1.06	–	–	–	–
Control[a]	–	3.10	0.74	0.06	0.19	0.39	–
Control[b]	–	3.12	0.63	0.04	0.18	0.31	180[e]
0.5	–	3.17	0.47	0.05	0.19	0.02	149
1.0	–	3.16	0.46	0.06	0.18	0.01	142
2.0	–	3.16	0.47	0.05	0.19	0.01	104

[a] Samples taken before malo-lactic fermentation.
[b] Samples taken after malo-lactic fermentation (natural).
[c] Total acidity as g tartaric acid per 100 ml.
[d] Volatile acidity as g acetic acid per 100 ml.
[e] Incomplete malo-lactic fermentation.

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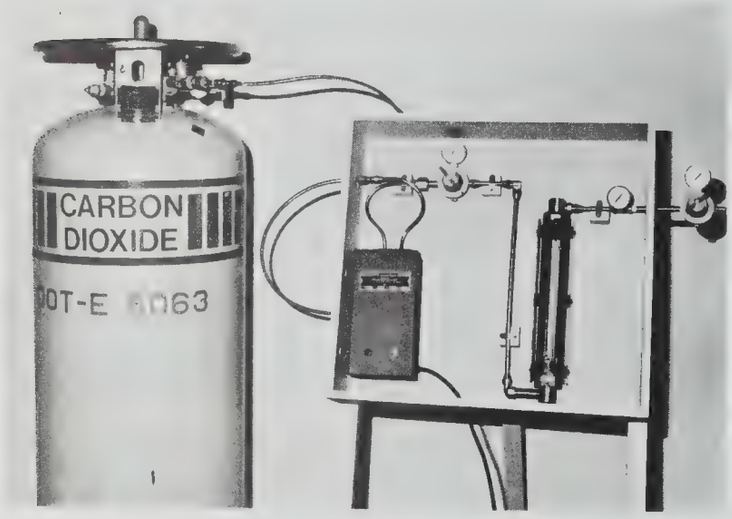

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The second item, an electric vaporizer to convert liquid Carbon Dioxide to a gas, has the capacity to vaporize approximately 300 cubic feet of liquid per hour or to purge over 5,000 bottles per hour. The electric vaporizer insures the flow of CO_2 in gas form to the regulator precluding the flow of liquid CO_2 and the resultant freezeup of the regulator and loss of control to the bottling line.

A flow meter is the third item, which accurately measures the flow of CO_2 to the bottles, and a temperature indicator is provided to monitor the temperature of the gas. The thermometer also measures the performance of the vaporizer to insure that the gas being induced into the bottles is approximately the same temperature as the bottling room. The flow meter insures the proper quantity of gas to the bottles without adding excessive amounts of CO_2 to the bottling room which might cause employee headaches and subsequent lowered production.

Advantages of this CO_2 system are several. CO_2 is heavier than nitrogen or air. The specific gravity of these gases at 70°F are: Nitrogen, 0.967; air, 1,000; and carbon dioxide, 1.522. Three times the bottle volume of nitrogen is recommended on the bottling line. Because of its heavier weight, less CO_2 is needed. CO_2 is generally less expensive to purchase than nitrogen on a cost per cubic foot basis, CO_2 being about 15% less in similar quantities.

Joseph Phelps Vineyards, St. Helena, CA, received the first installation recently and Walter Schug, winemaker, believes any possible 'spritziness' in his white wines will be negligible. In fact, the CO_2 will freshen up the wine, and maintain the character of the wine, including the esters and aroma components.

At Phelps, the 3300 cubic foot tank lasts about three days while distributing 90-l00 cubic feet per hour to 40 bottles/minute, which insure an oxygen level in the bottle of 1-2ppm ahead of the filler. The labor saving of moving four 50 pound gas cylinders a day for the previous system is much appreciated.

John Pedroncelli, winemaker at J. Pedroncelli Winery, Geyserville, CA, reports satisfaction from his installation on the bottling line. "We now have guaranteed consistent flow and reliable monitoring," says Pedroncelli.

The vaporizer has been installed at Fetzer Vineyards to supply CO_2 to their 110 bottle/minute line. Paul Dolan, winemaker, prefers to use CO_2 instead of nitrogen because it is a heavier gas, giving less chance of losing the gas from the bottle prior to reaching the filler. Dolan also noted a saving in the lower cost of CO_2 over nitrogen.

Gary Minnis of A-L Welding Products reports the price tag of the system to be approximately $500-1200 and the cryogenic liquid cylinder rents for $2.00 per day. Minnis can be reached at 3017-H Santa Rosa Avenue, Santa Rosa, CA, 95401 (707) 575-8654.

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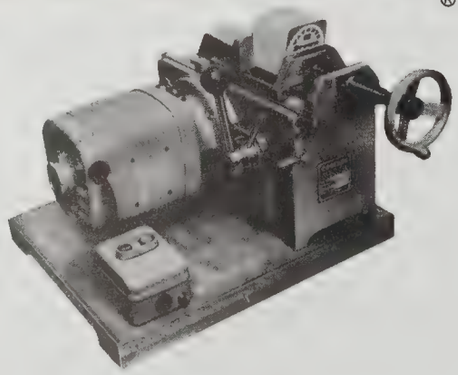

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Cakebread Improves Vineyard With Drainage

By Jack Prichett

In 1982, Jack Cakebread, owner of Cakebread Cellars, bought a vacant eleven acre parcel of land adjoining his ten year old vineyard and winery in Rutherford, CA. A vineyard until 1978, the plot had never produced quality wine grapes for the previous owner.

Poor drainage was the problem: there were two large wet areas several hundred feet wide. They showed up prominently in aerial photographs of the property commissioned by Cakebread. "With permanently moist soil, you will never get high enough sugar levels in the fruit to produce premium wines," commented Cakebread.

Cakebread turned to the solution a growing number of Napa Valley vineyardists are adopting. During September and October 1982, he installed field drainage throughout the eleven acres. Following the drainage installation, the field was fumigated and now stands ready for planting.

Cakebread is betting that field drainage will repay his investment with increased yields of higher quality fruit. He hopes to reap other benefits also.

Below is a report on how Cakebread's new drainage system works, followed by a step-by-step account of its installation and a review of recent advances in drainage technology.

Drainage of Cakebread's roughly triangular eleven acre field was accomplished by installing 2450 feet of ten and twelve inch pipe along the north and east boundaries to intercept runoff coming into the field from adjacent acreage. An additional 5200 feet of four inch pipe, crossing the field in parallel lines, drains the field itself.

These four inch 'laterals' are spaced at 50 foot intervals in the two poorly drained areas and 100 feet in the rest of the field. They drain into a six inch line running along the south edge of the field, which empties runoff into a twelve foot deep sump installed at the southeast corner of the property.

On October 19, when all drainage pipes in the eleven acre plot were first connected, passive runoff measured more than 50 gallons per minute—this at the end of the dry season. 'No wonder the previous owner couldn't get his grapes to ripen!' exclaimed Cakebread, scratching his head in wonder at the torrent of water pouring into the twelve foot sump.

Cakebread's system links drainage of the new eleven acre field to his farm's frost protection pond and his older, established vineyard as part of an overall irrigation and water management scheme. Drainage water flowing into the twelve foot sump may be pumped via an eight inch PVC transport line into Cakebread's pond for use in irrigating the new vineyard or to supply the anti-frost sprinkler system. When the pond is full, excess drainage water reaching the sump flows passively into a nearby drainage ditch emptying into the Napa River.

Cakebread is also installing drainage lines between every fourth row in his ten acres of established vineyard. This results in 48 foot spacing between lines, since his rows are on 12 foot centers. The collection lines from this drainage scheme flow to the farm pond or, if that is full, to outlet mains leading to the 12 foot sump.

Drainage installation in the established vineyard is proceeding in phases, with only about one fourth in place now. When completed two years from now, the system will assure Cakebread of excellent drainage throughout his entire vineyard.

TRENCHER INSTALLS four-inch pipe, directed by laser rector.

Installing the Pipe

Drain pipe was installed using the latest methods. Dan Reagan, whose San Joaquin Drainage, Inc. of Stockton, CA performed the job for Cakebread, remarked, "During the past decade the computer, laser technology and improved materials and machinery have revolutionized the speed and ease of field drainage installation."

Pipe was laid by a Barth chain trencher capable of trenching up to eight feet deep, laying drain pipe on a gravel bed and backfilling the trench in a single operation at up to 30 feet per minute. The machine is guided by a laser beam emanating from a transmitter stationed at a fixed point in the field.

In the trencher cab, an on-board computer, programmed to excavate to the depth and grade specified by the drainage engineer's plan, automatically controls the pipelaying, using the laser beam as its guide for elevations. The entire process requires only a four man crew. Drain pipe used was corrugated, perforated polyethylene tubing. The 100 and 250 foot rolls in which it is manufactured permit the laying machine to progress without frequent stops to join sections, as was necessary with earlier materials.

Plastic pipe is cheaper, more compact, and easier to handle with less breakage, than concrete or ceramic, which Reagan claims are no longer even used in California. The cost of plastic pipe, he adds, has risen only 50% since 1973.

Cakebread's vineyard drainage system was designed and installation supervised by engineer George True of Fresno. Installation and preplanting soil preparation involved the

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following steps:

The field was surveyed and staked out to mark cut lines for the pipelaying machine to follow, according to True's engineering plan. The program to guide the machine in the depth and gradient of its cuts was then programmed for the on-board computer. Actual pipelaying required about five days, spaced out over a two week period.

Once the drainlines were in, the soil was ripped in two directions using a 40 inch, Caterpillar-mounted shank. This ripping was followed by two discings in cross directions and a leveling to smooth the soil. Finally, the soil was fumigated, using the tarp cover and injection method, with methyl bromide to control for oak root fungus, nematodes and Phylloxera.

Cakebread estimates that costs for drainage installation on the eleven acres plus the soil preparation costs of ripping, discing and fumigation total approximately $50,000. "I expect to harvest high quality grapes now, off what was previously only marginal land. I don't count the investment in drainage as high at all," says Cakebread.

Costs for drainage vary widely, depending on soil types, obstacles such as trees or boulders, and slope. Because of these factors, it is difficult to establish a generally applicable per-acre price, but Dan Reagan estimates, "For close spaced drainage, such as Cakebread's on good, flat land, you should figure $1500-2000 per acre, depending on individual conditions.' This figure excludes costs for engineer's plan, ripping and fumigation.

Drainage on the Increase

In the Napa Valley, where most Class I (deep, well drained) soils are already under cultivation, any technique that can improve marginally productive fields is valuable, a factor vineyardists like Cakebread are banking on. Cakebread notes that other growers are also tearing out old, diseased vineyards and replanting after drainage installation and fumigation.

Drainage can improve already good soils, too. Robert Mondavi Winery, Beringer Brothers, and the Napa Valley Vineyard Company are among those installing drainage in some of their fields.

Besides improving soils, drainage brings smaller side benefits. A drained field dries out more quickly after winter rains. This allows farm vehicles to enter sooner than otherwise, thus permitting earlier pruning and cultivation.

For all these reasons, there should be increasing installation of field drainage in the Napa Valley. Engineer George True has observed the trend: "Five years ago, I did a couple of jobs here, and about five or six the next year. When I started my practice I was in St. Helena, but left because there wasn't enough drainage work to keep me busy. Now I am headquartered in Fresno and spend half my time up here!"

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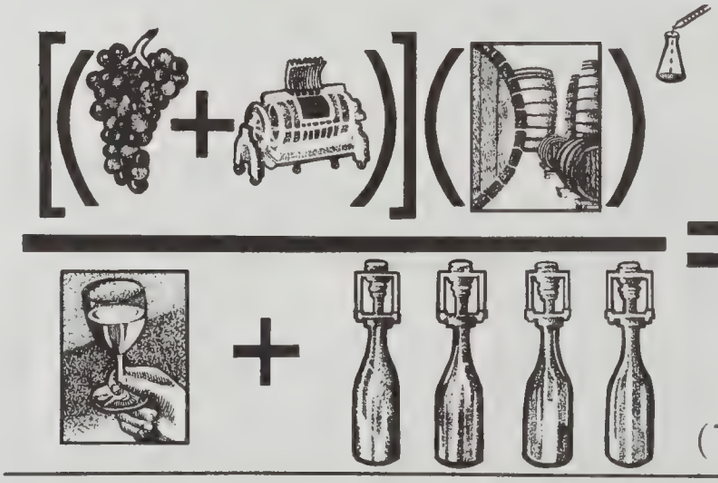

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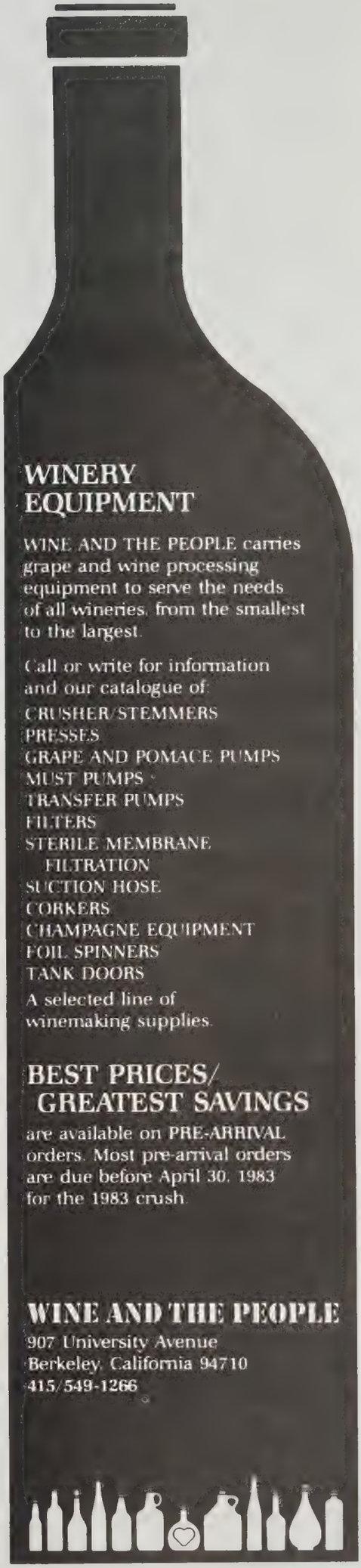
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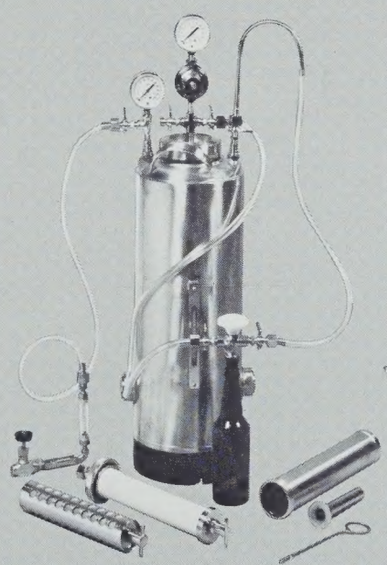

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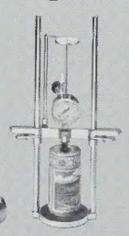

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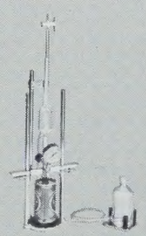

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